The Builder.

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Proposed Roman Exploration Company.

FRESH notice is being attracted to the subject of the exploration of the buried relics of Rome, archæological or artistic, to which we called the attention of our readers last September. Mr. J. H. Parker, C.B., whose excavations in Rome have already led to discoveries of no small value, is again in the field. He proposes to raise a fund of 50,000*l.* by way of capital of a limited company, to be formed with the object of purchasing land in Rome, exploring it to the utmost, and then reselling it—it is presumed at a profit—for building purposes. There can, we apprehend, be but little doubt that explorations such as Mr. Parker and his friends have now, for some time, conducted in the Eternal City, will in future only prove practicable under widely different conditions. While the incubus of priestly government brooded over Rome, the very pride which even the Italian peasant takes in the relics of the ancient glories of the country was extinguished by the harsh tyranny of greedy ignorance. Rome, though still calling its chief dignitary by the Pagan title of Pontifex Maximus, claimed to be regarded only as a Christian city. The walls of Romulus, the *cloaca* of Numa, the temples of Republican times, were only to be endured in ecclesiastical Rome if christened and whitewashed. Even the very names of that earlier time, with which the essential forms of the Papacy are so much more closely connected than its advocates choose to admit, were often whimsically travestied in monkish garb. It is difficult to recognise the *Xystus vetus* under the title of Santo Sisto Vecchio, or the *Mutatorium Cæsaris* in San Cesareo; but transmutations of the kind may serve to show the manner in which Roman antiquity was dealt with by Romish ingenuity.

No doubt can be entertained that English archæologists will find their position at Rome very different under the Italian Government, from what it was under the Papacy. The great object, under the latter, was to collect *bajocci*, under all and every pretext. To attract foreigners to spend money in the city, was the sole industry of Rome of late years. Even such mites as the payment of rent or damages for leave to dig were not to be despised. Nothing can be more characteristic than a little incident casually mentioned by Mr. Parker. Last winter, under the friendly offices of the Monks of St. Gregorio, he obtained permission of their lessee to open a pit in a garden belonging to the convent, for the consideration of 10*l.* The pit was accordingly sunk to the depth of 24 ft., and discovered the well-known pavement of the Via Appia, and fragments of the travertine gateway built by Domitian for the Porta Capena; showing that there were two archways to this gate. No sooner, however, had the excavation proved thus productive of information, than the *locatario* comes down on the straightforward Englishman. 10*l.* was the price for opening the pit. That bargain was settled. Now the pit must be filled up again. There was no bargain for keeping it open! So good Mr. Parker had to pay a further sum of 20*l.* for permission to keep his pit open for six months!

This is only a characteristic instance of the manner in which Englishmen, bent on historic research, are regarded in Rome. How much can be got out of them is the one question; nor, we will venture to assert, is any foreigner safe from plunder, unless he avails himself of the services of an Italian lawyer. These gentry alone, from long practice, can meet the fertile and inexhaustible ingenuity of their own countrymen with what they call matters of business, but which we, poor simple islanders, are apt to regard as ably-utilised opportunities for swindling.

Now without supposing that any great moral change has been effected in the Roman citizen by the hoisting of the Italian tricolor on the Quirinal, it must be borne in mind that the state of things has undergone a great alteration. The new Government, though inheriting very much of the spirit of the old, yet owns some deference to the public opinion of Italy, and, perhaps, some to that of Europe. It cannot afford to wrap itself up in contemptuous indifference. It may be, and we believe is, quite as reluctant to do any act of justice that involves parting with a grain as was either of the most corrupt Governments which it displaced. But it must at all events put some face on the matter, which it was not necessary for its predecessor to do. Now the Italian people take a great pride in all visible proofs of their former grandeur. Not a peasant so dull but he respects the relics of antiquity. This respect must be evinced by the Government. Exploration and restoration, even if they cannot be made self-supporting, form a popular mode of giving employment to some of the legion of idlers who seek to eat the bread of the country; and the prosecution of works of this nature looks respectable, both at home and abroad. Thus the uncovering of Pompeii is being steadily prosecuted, at the expense of the State, under the able and modest direction of the Chevalier Fiorelli, who, as private secretary of H.R.H. the late Count of Syracuse, had the care of much of the archæological research carried on at the expense of that unfortunate Prince. Then the Italian Parliament has voted 12,000*l.* for the purpose of excavating the whole of the Palatine Hill, with the slopes round it, as far as the Forum Romanum and the Arch of Janus on the north, the Via Sacer and Clivus Sacer on the east, the Arch of Constantine on the south, and the Circus Maximus on the west. Already have discoveries been made which indicate that the pestilential condition of Rome is due rather to the constant violation of the laws of health, whether as regards the decency of the living or the disposal of the dead, than to any mysterious terrestrial *miasmata*. Even supposing, then, the anxiety of the Government for discoveries to be real and practical, it would be their duty to supervise all excavations carried on in Rome; to see that their course and consequences were strictly subordinated to sanitary considerations, and that they formed integral portions of some well-considered and comprehensive plan.

Now, if we were to learn that an Italian Archæological Society had been formed for the protection of Avebury or of Stonehenge, for the restoration of Uriconium, or for the excavation and leaving open those portions of tesselated pavement or other Roman work which have been, within the last few years, discovered in London, we should hardly be apt to treat these volunteers with too much gratitude. After all, it is not clear whether a better case could not be made out for an Italian protectorate of English,—or rather, Roman,—archæological remains in this country, than for an English occupation of those of Rome. The Italians do respect their relics,—the English, as a people, do not. The rapid destruction of some of the grandest relics of an unknown past which has taken place, since the time of Stukely, at Avebury, would have been an offence against the public law of Italy, and would have been repressed by authority if (which is most unlikely) any Italians had been found brutal enough to attempt it. Then the great military roads that opened our previously pathless forests; the fortified camps which have left their names, in the form of the affix of Chester, in so many counties, even as they have left traces of the normal plan of the Roman *Castrum* in the four-way streets of Gloucester, and many other cities of Roman origin; the actual remains of imperishable reticulated brickwork, or of tesselations, the materials of which were taken from yet older buildings;—in all these things the Italians of to-day have a hereditary interest even more direct than our own. Nor can we, on any possible grounds, pretend to so much right to explore Italy as an Italian archæologist might claim for the exploration of England.

Under these circumstances, we think that the plan now suggested, should it meet with enough support to assume a definite and digested form, is perhaps the only one under which it will be feasible for English enterprise to make any satisfactory progress in the recovery of the ancient historic evidence of Roman archæology. To purchase land, at a fair price, in the open market; to investigate thoroughly all structural remains; and subsequently to sell the land for building, is a scheme in itself possible. Moreover, it has the advantage of not being one altogether of an eleemosynary character. There is some prospect, if not of a return, at all events of a dividend, of the original subscription to the subscribers. Many a man would be likely to contribute his 10*l.* on the understanding that, if not exactly an investment, yet it was a purchase of a chance. Archæological knowledge would certainly be increased, if the money were wisely expended. And the fair probability would remain that the shares might be worth their nominal value.

Of course, something distinct and definite will be announced by Mr. Parker as the arrangement in virtue of which he invites subscriptions. Some board of directors must be named, some responsible trustees for the proposed investments. Above all, it will be desirable, that intending subscribers should be informed under what legal advice their money is to be laid out. On this, indeed, the whole stability of the project will depend, so complicated are the claims affecting landed property in Italy, and so usual is the appearance of some lurking prior mortgage, after the purchase-money has been paid, that a degree of caution quite foreign to our English habits is necessary in any transaction of this nature in that country. Moreover, it is necessary, to avoid trouble hereafter, that the goodwill of the Government should be assured. Here, again, an Englishman will naturally inquire what possible effect can the good or ill will of a Government have on the purchase of property from the owners? He will find that in this case it has much to do with it. The powers of interference with his proceedings are great, and may be exercised, at the instigation of some insignificant enemy, in a very annoying manner. Objects of art, for instance, are claimed by the Italian Government as a sort of treasure-trove. Wherever a claim of this kind exists are to be found all sorts of rights of inspection and conservation that may prove intolerably vexatious if any ill-feeling exist. Mr. Parker tells us that he has obtained written permission from the Italian Government to make excava-

tions in any part of Rome. Of course, in coming forward as promoter of a company, he will desire to discharge himself of any unnecessary responsibility, and will take care to print and publish the exact text of this permission. It will be necessary also to show that the local laws with reference to public companies are exactly and formally complied with. In fact, there is a good deal which must be done before subscriptions to a limited company can with propriety be received.

We treat of the subject with much sympathy with Mr. Parker. He has devoted much time, labour, and money to the service of archæological discovery. Labouring under the disadvantage of the absence of a professional education, he has yet produced works that are valuable to the architectural student as well as to the archæological amateur. To say that he has a hobby, is only to say that he is one of those men to whom science is generally indebted for most of the impulses to its pursuit. To say that he makes mistakes, is only to say that he is one of those whose discoveries are not limited to the side of the highway. He has spent, he tells us, half of his fortune in Rome; and it would be well for the world if the pursuit of unwritten evidence had many such disinterested votaries. His discoveries have been neither few nor small. His labours have been incessant. Our own hearty concurrence, moreover, is due to the moral tendency of his labours. At a time when criticism has pushed its analysis to the extent of absolute destruction of our records of the past, it is very much to find a man who comes honestly forward to say, "Romulus was not a mythical personage, for here is the masonry of his wall; Roman history is not a series of fables, for here are the traces of kings, consuls, and emperors." If Mr. Parker went no further than he has done, he would rank as a benefactor to the most important of sciences, the philosophy of history. It is the more needful that he should be kept free from any entanglement with what he has himself experienced to be a very untrustworthy administration; and that any investment of English money, to such an extent as 50,000*l.*, in Roman land, should be placed under the most formal guarantees competent to the laws of the country and to the administration of the kingdom. Long and bitter experience has taught us how ready the various Italian Governments are to encourage the flow of English money to fertilise the long arid soil, either of the wastes around Brindisi or of the valleys covered by the *débris* brought down by the Po. But when it comes to question of return,—*Hic labor, hoc opus est.* The old maxim that no faith is to be kept with heretics appears still to be honoured at Florence. Englishmen, we know, *are* heretics.

Mr. Parker suggests no less than thirty explorations and excavations to be pursued in the coming winter. Among them, that which strikes us as the most important, serving in no small manner as a key to more, is the completion of the marble plan of Rome, attributed to the third century, and mentioned by the historian Panvinius. Fragments of the plan were discovered in 1867, in an excavation undertaken by the monks of SS. Cosmo and Damiano. Its completion, and publication by means of a permanent photographic process, is not only most important as an archæological procedure, but would be of great service to the exploration as furnishing a sort of block plan, by reference to which the course of discovery can be conveniently indicated.

The incidental mention made of this important record of ancient topographical science, as the twenty-second out of thirty objects proposed for investigation during the coming winter, is an indication, in our opinion, of the main cause why the efforts made for the exploration of Rome, no less than those for the exploration of Jerusalem, have hitherto attracted so much less public support than the actual importance of each subject demands. Professionally, educated archæologists are very rare. Very imperfect views are but too common as to the relative value of the remains of different eras of structural art; and prehistoric archæology is much confounded with architectural antiquity. Hence it happens that interest in the actual discoveries of other people is not uncommonly very vivid. Many a man may find pleasure in grubbing about on his own account, turning up, with equal content, a denarius of Carausius, or a silver penny of Queen Anne, who cares but little to know what discoveries are in progress in the adjoining county. Again, many a man may be capable of making a good survey, of grasping the military features of an ancient fortification, of tracing the course of an aqueduct, or of carrying out detail after detail of local investigation, who has not the logical and orderly grasp of mind needed for the clear enunciation of the great historic problems to be illustrated by the result of his toil. And again, a man thus fitted to direct a survey of the kind, can only, by the rarest chance, have the habit of the publicist, the power to bring before the world, clearly and incisively, the main outlines of his case, in such a manner as to win or to command attention. It is certain that this must be done, in order to attract the interest of any large portion of the public. Of Rome every one has heard, and of Jerusalem every one has heard; but what we may expect to discover in either locality, for what we should look, and what will be the value of the discoveries we seek,—these are matters which the public must have explained to them, not only before they will take the trouble to send post-office orders but even before they will so much as read through a column of details in small print in the daily papers. In this preliminary statement of their object, illustrated, year by year, by the clear description of the successive discoveries, each referred to its proper head, both the Roman and the Palestine explorers have been signally deficient. It the latter case it is the less excusable from the block outline which we ourselves supplied (*Builder*, 4th January, 1868) of the seven successive cities that have been reared on and around the hill of Zion; the eighteen successive architectural eras indicated by history; and the locality, or other features, distinctive of each. To burrow at haphazard, lighting now on a coin of the Seleucidæ, now on a lamp of the Arabic caliphs, now on a balistic ball of Titus, and now on a charred fragment of the cedar roof of Solomon's porch, is interesting enough for those who are engaged in the pursuit, but will never attract public support, unless as the detailed and orderly prosecution of a well-arranged scheme.

The exploration of Jerusalem, however, while it cannot claim support on the ground of such personal and disinterested exertion as Mr. Parker has devoted to the exploration of Rome, is illustrated by two important features, the excellence of which we cannot too strongly urge the latter investigators to copy. The admirable education of the Royal Engineers, in surveying and mapping country, has been turned to the best account in Palestine; and the Ordnance maps which have been completed and engraved, are permanent contributions of great value, both to topography and to geography. Again the photographs taken by the non-commissioned officers of the same corps are clear, well-defined, and effective.

In the repeated exhibitions to which Mr. Parker has invited us of the products of his own labours, we have had more than once to regret want of due attention to these two important particulars. A map of Rome and its environs, on which the various discoveries could have been indicated, would of itself have been a valuable production, and would have enabled people to see at a glance what was in hand. The definition of Mr. Parker's photographs, as a rule, has been extremely imperfect. Out of more than two thousand, there are but few that any one would care to look at as pictures. As records they are, no doubt, of much value, though the appearance of the prints does not promise any permanence even of their present indistinct details. One-fourth of the number of views, taken with artistic selection and with mechanical beauty, would have set many of us half wild after the exploration. It is not the case that the climate of Rome is naturally unfavourable to taking good negatives in the camera; for those taken by M. Braun, and reproduced by the carbon process, are some of the most admirable works ever yet effected by any branch of graphic art. If the services of this photographer are available, a very few prints from his factory would be worth a great number of inferior, *quasi*-amateur, productions.

In Rome itself exist relics of the cradle of European society. While Regal, Consular, Imperial, and Papal Rome are not divided from one another by the broad lines of fire and of steel that Nebuchadnezzar and Titus drew across the walls of Jerusalem, still the principal buildings of the various eras, however grading into one another, are to be recognised by well-marked features. Portions of the *Arx* of Romulus yet remain on the Palatine Hill. The stones employed are 4 ft. long, 2 ft. wide, and 2 ft. deep. They are split off from the tufa quarries by means of iron wedges, exactly as these quarries are worked in the present day, and do not appear to have been dressed, or but roughly so, with the axe. The building of the later kings shows some reduction in the size of the blocks. Fragments of the wall of Servius Tullius are to be found on the eastern side of Rome, running on the high ground for a mile, and connecting, by a great *agger*, the several *arces* of the famous seven hills. In this wall the stones are wrought and closely fitted, and secured to one another by iron clamps, not run in with lead. From these samples of the art of the mason 2,600 years ago, down to the most finished and splendid productions of the time of Hadrian, archæology can trace both the progress of the builder's craft and the growth and development of the city. In the catalogue of photographs, printed in 1868 by Mr. Parker for private circulation, are to be found a valuable historic series of the successive styles of work, and a general distribution of the photographs into appropriate classes. It is much to be regretted that this arrangement was not carried on and perfected. The catalogue of the 1,800 photographs exhibited in New Bond-street last year is without any order except that in which the photographs happened to be taken. Mr. Parker's materials are rich; his knowledge is extensive. For such a systematic programme as we have indicated he could readily supply ample data. The authorities for dates, very briefly referred to in his preface last year, should be distinctly set forth. The general scheme of his researches, divided into historical chapters, should follow. Results already obtained, referred to their proper heads, would then be regarded in their proper light; and archæological and historical students, seeing what was actually in hand, would be likely to strain their energies to find Mr. Parker the support which he requires.

Whatever be the complexity, or even the error, of detail, whoever be the labourers,—the Archæological Society of Rome, the newly-projected company, the Italian Government, or any native and private explorer,—the value of a competent survey of Rome cannot easily be overestimated. We have good hope that the time has now arrived when this important object will be steadily and worthily pursued. However much or however little may henceforward be effected by English funds, it must not be forgotten that Oxford has sent forth a pioneer, who laboured for the elucidation of Italian history while Italy was no more than a geographical expression. The mere presence at Rome of Englishmen able to pass educated criticism on the efforts of Signor Rosa (which seem to be rather in the direction of what is called restoration than of discovery proper) is important. The whole of learned Europe will listen with interest to clear and impartial accounts of any attempt to draw back the veil of so many centuries. We are happy to call attention to the present proposal of Mr. Parker; and we need not say that we heartily wish good speed to every well-considered effort to show light on the archæology of Rome.

THE BRIDGES OF LONDON.*

The Bridges considered as Means of Communication.—The question of communication between the north and south sides of the Thames at London, always has been, and always must be, a matter of the greatest importance. It is now a question of some difficulty on account of the great accumulation of business at the east end, considered in connexion with the very large traffic on the river up to London Bridge. The two great traffics by land and water, as it were, overlap. Bridge communication is much wanted in the neighbourhood of the Tower; the great river traffic, however, will not admit of interference below London Bridge, except at enormous cost. High level bridges have been proposed, a tunnel has been constructed, but still the traffic from the east of London Bridge comes to that crowded thoroughfare, and there is no immediate prospect of any change in that respect.

Much has been said lately and proposed with a view to widening London Bridge, but the difficulty is not so much on the bridge itself as in the approaches. The object should there-

* By Mr. Henry Carr, C.E. From a paper read at the Royal Institute of British Architects, on Monday evening, December 4th.

fore be to divert traffic westward as much as possible, thus relieving the easternmost bridge by diverting that traffic to the west which might go westward. The mode in which this might be accomplished will be alluded to presently.

If it be determined to widen London Bridge, it should be so done as not on any account to interfere with the general elevation, any addition by ironwork would be a barbarous proceeding, destroying the effect of one of the finest bridges in Europe; and, moreover, as before stated, such addition to the bridge would not relieve the approaches which are as objectionally crowded as the bridge itself. Again, the foundations of the bridge would not admit of more weight being put upon them: that objection would be fatal to several plans which have been proposed.

One suggestion, which has been for some time before the Bridge House Estates' Committee, is shown by the two plaster models: this plan is considered as the utmost that should be attempted; the addition would be 27 per cent. to the footpath, a valuable increase, as would be evident to any one watching the southern railways when pouring their thousands into the City in a morning. This suggestion would not interfere with the general elevation of the bridge as seen from the river. The proposal is to thrust the parapet somewhat over on to the cornice, and to make it as thin as granite will admit of being worked and fixed with safety. The footpath is now 9 ft. in width, the addition would be 2 ft. 6 in. on each side, thus making the footways 11 ft. 6 in.

However, as said before, the great object should be to lead the traffic westward, which can only be done by improving Southwark Bridge. There have been three great objections to the use of Southwark Bridge.

First the toll: that is now done away with.

Secondly, the want of good access, both north and south: New Southwark-street on the south and Queen Victoria-street on the north, have obviated this difficulty.

The third objection to the use of Southwark Bridge is the steep approach and narrow width: this is the point still to be dealt with.

It is proposed to take down the existing cast-iron arches, and to substitute arches of wrought iron; by this change of construction the thickness of arch and road material might be reduced from 9 ft. to 5 ft. 6 in. It is proposed also to reduce the headway underneath from 29 ft. 6 in. above Trinity highwater to 25 ft., making it the same as under New Blackfriars, the summit level of the roadway would thus be lowered 8 ft., which would admit of the gradient on the south side being altered from 1 in 26 to 1 in 43, and on the north approach from 1 in 20 to 1 in 40; 1 in 40 being the standard of good gradient fixed by the Bridge House Estates Committee for New Blackfriars.

In altering the arches it is proposed to corbel out the footpaths, increasing the width of the bridge from 42 ft. to 54 ft., thus making it the same as the present London Bridge.

The nearest route from the Bank to the Elephant and Castle is over Southwark Bridge; if, therefore, the approaches were made good and the width of the bridge increased, it is felt that a considerable proportion of the London Bridge traffic might be thus drawn westward.

There is a curious fact regarding tolls illustrated by a circumstance in connexion with this bridge. The bridge was thrown open, toll free, on the day of the entry of the Prince and Princess of Wales into London, and some little pains was taken to advertise the fact; a large traffic came over on that day, and such a permanent increase of traffic continued as to raise the dividends 33 per cent., till the tolls were finally abolished. After long negotiation an arrangement was effected with the City authorities to throw open the bridge, toll free, for a year as an experiment, it being well known, on the part of the Bridge Company, that when once thrown open toll free it could never be closed again.

The bridge cost 660,000*l.* cash. The value of the bridge at the time of sale, arrived at by capitalising the income at 5 per cent., would be 60,000*l.*; the sale was effected at 200,000*l.*

To say nothing of the value of the bridge itself, equally good approaches could not have been purchased and cleared in any site so suitable for less than a million, the bargain may therefore be considered a fair and good one for both parties.

It is no doubt desirable that Waterloo Bridge should also be thrown open toll free, but though the original shareholders have never received any dividend, the annuitants are in receipt of a very considerable income, to buy off which, and to pay the original shareholders something, would amount to a very considerable sum,—far more than at present there is any prospect of being given by parties interested in this locality, which is beyond the reach of the City purse.

The rebuilding of Westminster Bridge of a width of 84 ft. has provided ample accommodation there. It may be regretted that the inclination on the bridge itself has not been made a little steeper, in order to ease the approaches; the gradient on the bridge is 1 in 58, and the approaches 1 in 30 at the steepest part, whereas a general inclination of 1 in 43 would have been more advantageous for the road traffic, without interfering to any appreciable extent with the river traffic; the approaches have been somewhat sacrificed to the bridge, instead of considering the whole as one work, and giving the best possible inclination throughout.

Lambeth Bridge was built to meet a supposed want, but it is singular how little traffic there is really found to go over. From parts of Pimlico to the City this bridge offers a good route, but the traffic from Pimlico to the City is very small, and with an Englishman's inveterate objection to tolls, the route by the Thames Embankment no doubt takes the bulk of the passengers who do not go by omnibus.

Vauxhall Bridge occupies a site of considerable importance, and though it is on the outskirts of the metropolis, a fair amount of traffic from the West-end to the south of the Thames takes this route. The extension of the South-Western Railway to Waterloo Bridge, and lately the formation of the southern embankment from Vauxhall to Westminster Bridge, has caused a very severe loss to this company.

Chelsea Suspension Bridge is a valuable communication for residents in the adjoining localities, and will probably become of increased importance as the southern side of the river becomes more populated, and every year as building increases, free access to Battersea Park becomes the more desirable; but still this bridge, though no doubt one of "the bridges of London," can hardly be considered as taking part in the great metropolitan traffic.

The Bridges considered as mechanical Structures, with reference solely to Strength and Stability, will lead naturally, in the first instance, to the question of Foundation.—The original timber bridges which crossed the Thames at London towards the end of the Saxon reigns and the beginning of the Norman are involved in much uncertainty, but there seems evidence of examples of the importance of driving the piles of such bridges deeper than was then accomplished, for they were washed up by floods, and pulled out by the Danes to a very serious extent, carrying with them the superstructure.

The defect of these piles probably led the builders of the first stone bridge into the opposite extreme,—namely, making the piers too massive, and by their very mass intended for strength, leading to destruction by increased scour. The preservation, maintenance, and extensive repairs of the first stone bridge appear to have been a serious difficulty and constant expense from the very date of its completion. The foundations were, in fact, defective from being too wide. The depth of piling might probably have been sufficient, had not the waterway been blocked up by the great width of pier, thus causing scour.

The piles of the first wooden bridges were not stable. The foundations of Old London Bridge were not altogether successful; therefore in building the next bridge, Westminster, another plan was tried,—the French system of caissons; in fact, barges in which the piers were partly built while floating, then sunk in place, and the sides removed, the site having been dredged to receive them. The objections to this plan are, that a perfectly level bed cannot be obtained, and the caisson bottom must inevitably rest, in the first instance, on limited portions; increased weight and time will no doubt produce a more even bearing, but it must involve settlement to some extent.

This caisson system was adopted at the next bridge built—Blackfriars; the caisson bottoms or platforms on which the piers stood, lately taken up, were 88 ft. by 37 ft., and two balks and a half thick; area, 3,256 ft., bearing a weight of about 11,241 tons, or 3½ tons per foot superf., supposing the whole area to take its share of load equally; but, in fact, the weight was carried by a much more limited area, the load per foot on the surface of timber area of footing was about six tons. The timber projecting beyond the footings could not have taken any material weight. Had this weight been evenly distributed over the whole bearing surface, that surface being the London clay or gravel, resting on the clay, the foundation might have been good enough as long as not undermined; but there were symptoms of the arches having yielded on the centres being struck, which leads to the suspicion that the pier foundations had slightly moved—in fact, had come to their bearing as the increased weight came on. In arches Nos. 5, 6, and 7 from the south, lead was found run into joints on the north side; in each case the arches evidently having lurched over to the south, opening the joints on the north haunch, lead was run in as much as 1 in. thick at extrados tapering inwards, the masonry joint being tight at intrados. The opened joints were not in one course through, but stepped a course up or down. It is supposed that some four or five tons of lead were taken out, but the greater part was stolen. This system of caissons is now universally admitted to be defective and inefficient, principally from liability to be undermined by increased scour.

Next in order comes Waterloo Bridge, the first of the bridges built in what may be called the present day, built after the date when engineering had become a distinct profession. The foundations of this bridge were of a totally different character from all preceding; no expense nor pains were spared; everything was done which at that time was considered most efficient. Coffer-dams of double piling and puddle were formed which did their work successfully, laying the foundation dry. Southwark Bridge followed on the same principle, and new London Bridge immediately after.

Taking the case of London Bridge, the area of the pier foundations was laid dry with coffer-dams 43 ft. below Trinity high water; bearing piles of whole balk were then driven over the whole space, 4 ft. and 3 ft. 6 in. apart; cross cills were laid on the pile heads, the intervening spaces were filled in with rubble and brickwork, the whole planked over, and the piers built on the foundation thus prepared. The weight on the foundation of the centre pier is about 21,151 tons: supposing this to be evenly distributed over the whole of the bearing piles, there would be a weight of about 88 tons on each pile, and, of course, on each cill crossing each pile-head. The specification describes these cills as either elm or fir. The sample of timber representing a pile-head and cross cills shows what the effect would be of a weight of 88 tons on each pile. The cills were crushed at 30 tons. Clearly they could only support a very small portion of the 88 tons. The bridge therefore, no doubt, rests principally upon the intervening spaces which had been filled in with rubble.

Supposing the weight evenly distributed over the whole area of ground, it would be 6 tons per foot, and this weight the London clay seems just capable of bearing; but it is a question whether the solid clay undisturbed in its natural condition would not have been far more secure than when broken up by driving the bearing piles. The London clay is not a spongy material requiring piles to consolidate it.

It is well known that the courses of the piers have a downward tendency towards the east about 10 in., and the eastern side of the superstructure has the same tendency, but not quite to the same extent: the average is about 7 in. The number of arch-stones fractured would lead one to suppose there had been motion on the piers receiving their load; but, on the other hand, the recorded small subsidence of the arches on striking the centres indicates the contrary.

The inclination of the courses is accounted for by one engaged on the works thus:—

"Denmark-hill, April 15th, 1869.

My dear Sir,—I have much pleasure in being able to give you the information you desire. There never was any settlement of the piers of London Bridge. I made the drawings of that bridge for Sir John Rennie. Messrs. Jolliffe & Banks were the contractors; their principal master of the works was Mr. Henfrey, who was a very competent person. He had a young man with him, Mr Hollingsworth, a relative. The foundations were constructed in coffer-dams, and the pumps fixed at the down stream end, the piles driven, and the platforms were laid with an inclination towards the pumps.

"The stone was dressed in courses at the Isle of Dogs, brought up and laid with that inclination, Mr. Henfrey intending to change the incline courses into horizontal before they approached low-water mark, but he died; and young Hollingsworth took the initiative, and did not dis-

cover the error before it reached the springing. He no doubt gained what he could afterwards.

I am, my dear Sir, yours very faithfully,

"Henry Carr, esq." (Signed) E. W. Morris.

There are difficulties in this explanation, more particularly as regards the fact that all the piers would not be in the same stage of progress at the same time, nevertheless the letter from one engaged on the works is of interest.

Sir John Rennie, the engineer, considers that a slight subsidence did take place in 1829, when the bridge was in progress. It is strange, however, that all the piers should have gone in the same direction, and nearly to the same extent.

In New Westminster Bridge another plan of foundation was adopted, resembling that in building Old London Bridge, the object in view being to avoid the expense of coffer-dams. The principal bearing is on 145 elm piles in each pier, driven 3 ft. 3 in. and 2 ft. 6 in. centre to centre, and cut off below low-water. These elm piles are surrounded with forty-four iron piles, 5 ft. centre to centre, with cast-iron plates driven between the piles, thus forming a complete casing, which surrounds and includes the elm bearing-piles. The interstices are filled in with concrete, making the whole solid.

The weight on these piers is so slight, when compared with that on the piers of London Bridge, that the question of foundation becomes of less moment. The weight per pile is about 15 tons, supposing the elm piles to carry the whole weight; or about 11½ tons, supposing the iron piles to take their share. Much the same question will arise with regard to these foundations, as in the notice of London Bridge. There is an outer casing of cast iron, the interior filled in. Query,—would not solid cement concrete, resting on a well-prepared bed, have made a more efficient and more durable foundation than piles of timber, the interstices only filled in with concrete? Homogeneity is the essence of strength. One homogeneous mass is the true foundation wherever it can be obtained.

The next system of foundation introduced was that of iron cylinders, open at bottom, and sunk into the bed of the river, by excavating inside first by divers; afterwards, when water-tight strata are reached, by pumping out and working dry; the interior, when a sufficient depth has been reached being filled solid with concrete or brickwork.

The railway bridges,—Charing-cross; London, Chatham, and Dover; and Cannon-street, are thus carried, the weight per foot on the bearing area varying from about 6 tons to 7 tons. The testing weights showed that foundations so heavily loaded have quite as much to do as they are prepared to take, the Charing-cross piers having subsided 3 in. and 4 in. with the testing loads.

Nothing can exceed the facility of putting down such cylinder foundations, and nothing can be better where sufficient area is given, and where such form is suitable to the superstructure. The weight required to sink these cylinders seems to be about 3 tons per foot of circumference, that weight including the cylinder itself and the load placed on for the purpose of driving it down.

There is one interesting circumstance with regard to the cylinder foundations of the London, Chatham, and Dover bridge. The cylinders were 18 ft. diameter. It was desired in six cases to give a more extended bearing area. The excavation was boldly and successfully carried down 5 ft. below the cylinder bottom, and the diameter of excavation was extended from 18 ft. to 21 ft., increasing the area 36 per cent. The cylinders were relieved of the weights used to sink them before being undermined; but no support was required to carry the cylinders, nor was any timbering requisite in the space excavated. This is a good illustration of the solidity of the London clay.

There is one very important distinction between railway and road bridges. *In railway bridges* the weight is always carried in the same position, and is naturally transferred on to definite and distinct points. Circular cylinders placed under these terminal points of the arch or girder become therefore suitable foundations. But the case of a road bridge is different, inasmuch as the varying traffic is distributed indiscriminately all over; the weight and strength of the bridge have, therefore, to be distributed also over the whole width, and consequently a continuous pier is more suitable than such isolated columns as are sufficient for railway bridges.

The suspension-bridges at Chelsea and Lambeth follow suit with the railway-bridges. Suspension-bridges are similar to those carrying railways, in having the weight collected and borne by few distinct and isolated points, the chains acting in that respect in the same manner as girders. Circular cylinders in road suspension-bridges are therefore suitable, for the same reasons as in railway-bridges,—the weight is accumulated on certain definite, distinct, and isolated points.

In rebuilding Blackfriars Bridge wrought-iron caissons were adopted, varying, however, very materially from those used in the piers of the railway-bridges. Each pier was formed by four rectangular caissons, 36 ft. by 18 ft., carrying the roadway, and two triangular caissons projecting beyond, and carrying the cutwaters. A space of 3 ft. was left between the caissons, which space was eventually filled with concrete, and bridged over by the masonry, at a level 4 ft. below water, the pier being continuous from that level upwards.

The two piers on the Southwark side are carried down to 42 ft. below Trinity high water; those on the City side, where the strata are softer, are 47 ft. The instructions received from the Bridge House Committee were to put in such foundations as would admit of the river being dredged to 30 ft. below Trinity high water, or 4 ft. lower than the then existing deepest part. The new piers are 14 ft. and 19 ft. deeper than the deepest of the old foundations, and are all well into the London clay. The lower part of the caissons, up to 4 ft. below low water, which are filled in solid with concrete and brickwork, are left in permanently; the upper parts were removed as the work proceeded, the masonry piers commencing at the above-mentioned level, and the width being reduced from 36 ft. to 22 ft. 9 in. for the smaller, and 26 ft. for the larger piers. The area of bearing surface is 3,739 ft., and the weight carried by the middle piers is 3½ tons per foot super., resting on the clay, which is about half the weight per foot on some of the railway circular cylinders. On an isolated foundation, where slight settlement would not affect or endanger the superstructure, a far greater weight may safely be placed than could prudently be trusted on a similar area forming part of the foundation of a large and continuous superstructure, such as the piers of Blackfriars Bridge, where slight settlement of any one portion would have disturbed and fractured the masonry above.

In the upper portion of the piers of bridges there is not such scope for variety as in the construction of foundations. For the Thames, the right material, no doubt, is granite, and the best hearting is good sound brickwork. Good sound brickwork, carefully built in Portland cement, or lias lime is stronger work and more solid than even ashlar throughout, but the granite facing must be well bonded in, not such work as is sometimes done,—a face carried up of stone nearly of the same depth throughout.

The arches of all bridges of any size or importance, up to a late date, were always of masonry; but after various examples of iron had succeeded elsewhere, cast iron was used for the arches of Southwark Bridge. In later times the manufacture of wrought iron has advanced so rapidly, and wrought iron offers such advantages over cast, that it is now almost universally used.

The cast-iron arches of Southwark Bridge certainly are a bold and noble construction. It is a singular and almost unique fact with regard to cast-iron arches that they were in the first instance made much slighter than in later works. The bridge at Sunderland, of 236 ft. span, has arches of about 46 in. area of metal. Southwark Bridge centre arch, of 240 ft. span, has arches of 6 ft. depth, and 122 in. area.

The tendency in all other works has been to give greater mass in the first instance, and to build slighter in later times. The builders, however, of Sunderland Bridge gave their successors no opportunity of paring down,—the margin of stability there was small indeed.

The danger with cast iron in general, and cast-iron arches in particular, is that of getting an unequal bearing, either from defective fitting or from expansion and contraction. The rise and fall of Southwark Bridge arches is about 1 in. for ordinary change of temperature, or about $\frac{1}{70}$ in. for each degree: such rise and fall must produce considerable variation in the load to be sustained by the extrados and intrados of the arches.

The brittleness of cast iron, together with the improved facilities for the manufacture of wrought iron, have led to the almost universal adoption of wrought iron for arches. If one portion of a wrought-iron arch,—say, the intrados,—should, from bad workmanship or other cause, have more load to carry than the strength of the metal will bear, a general compression would take place in that portion, and a corresponding shortening, allowing the remainder of the arch (the extrados) to come into play before any mischief took place.

Though cast iron, in the dimensions usually experimented upon, has probably double the power of resisting compression that wrought-iron has, nevertheless it is usual not to trust it with much more than about half the load, showing how strong is the general feeling of distrust in that brittle material.

As regards oxidation, however, the balance is much in favour of cast-iron, both from a less tendency to rust and also from the same absolute amount of loss being a less per-centage on the greater mass. This is a strong reason against using thin wrought plates in any construction exposed to the weather—the loss, say of one-eighth of an inch, by oxidation would be immaterial in a thick casting, but would be fatal in a quarter-inch wrought plate.

This question of rust was most carefully considered with regard to Blackfriars Bridge, but no satisfactory result was arrived at. A plan of dipping the iron hot into a bath of prussiate of potash and chloride of potassium, and further treatment with cyanide of potassium, according to Messrs. Morewood's patent, was entertained but abandoned as impracticable on so large a scale. The effect, when properly carried out, is to case-harden or convert the exterior surface into steel. The patent process of Madame de Lavenant was tried with great promise of success, but with ultimate failure. Her plan is to coat or paint the iron with a preparation of finely pulverised glass, which is then submitted to such a heat as will fuse the preparation, and form an enamel surface.

Ultimately the ordinary course of heating the ironwork and dipping in boiled oil was pursued, four coats of paint following;—asphalte paint for the interior surfaces, and Torbay oxide of iron paint finished with Messrs. Rose & Co.'s olive green for the exposed face.

The great desideratum of the day, no doubt, is some means of permanently protecting iron from rust: this is now said to be done by Turner & Allen, of Upper Thames-street. Their process is to coat the iron with bronze or copper in such a manner as to effect perfect union between the two metals. If this union of the two metals really be as perfect as stated, no doubt it will prove a most valuable discovery. Some specimens of coating both with glass and bronze are laid on the table for the inspection of those members who do not happen to be acquainted with these processes.*

THE DECORATION OF ST. PAUL'S BY NATURE AND ART.

If any apology were needed—and can there be any?—for reverting to the present and future of St. Paul's Cathedral, it would certainly be negatived by the significant sentence at the conclusion of Mr. Lupton's letter,—"Has Mr. Shone, who speaks for the Restoration Committee, nothing to say about the new painted glass windows?" It would be, as we think, exceedingly interesting just at the present moment if Mr. Lupton would give the artistic and architectural world the benefit of his thinkings on the subject of the new painted windows. There is always a wide difference between the criticisms of one of the public on a work of fine art and those of professionals. The professional is apt to look at the *means* too much, and to forget the *result*, while we are sure that the non-professional critic will look almost wholly, if not quite, at the result. There is no small advantage in this, as the real test of the value of an artistic work must always be, not the *how* it was produced, but what effect is has on the human mind and feelings when out of the artists' hands, and in its place. This thought is more important than at first sight it looks, and in the present case, that of the windows in St. Paul's, it is all important; for what we want to know is, what sort of impression is made on the mind of an intelligent and clever man by such work as this.

The windows in St. Paul's were commenced under peculiarly favourable circumstances, and

* To be continued.

great study and pains seem to have been employed in their production, by previous travel, and by looking out for the best examples to go by, and in the finding the best man to do the work. The result is, unfortunately, artistically considered, not a success; for these windows, like the rest of the new "decorative work" at St. Paul's, are the result of the system of *art manufacture*. Let us try to make this thought intelligible. One great difficulty we labour under, and it is this: that there is unfortunately no one public building in London which can be pointed to as exemplifying, in perfection or completeness, the solved problem of a "decorated building" as an artistic performance. We can only point to parts and sections of buildings,—here a roof, there a wall surface, and there a window, or a panel, but no complete work; so that the reader must build up, in his imagination, or, as the Germans would say, in his inner consciousness," if he can, what a *decorated building* by a great artist would be.

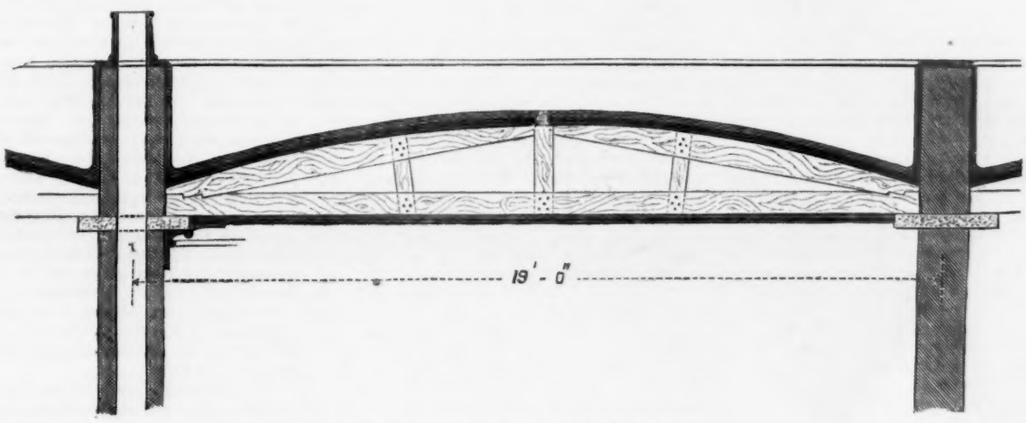
It is not a little difficult to treat a subject so extensive in a short space, but we cannot help pausing to wonder how it was that in the comparatively rude and poor days of Charles I., so magnificent and complete a work as the "Banquet Hall," and its painted roof, by Rubens, came to be done. No one now even dreams of *painting* the roof of the choir of St. Paul's in this way. Why, the whole of the city of London, with its Lord Mayor and all his surroundings, the banks of Lombard-street, and the whole of their world of wealth, would stand horrified and aghast at the bare idea. Yet why should it be so? The money-power in the days of King Charles was as nothing compared to what that power now is; and why should it be that in that by-gone day a work should have been produced of genuine fine-art and painting, the like of which we now do not even dare to contemplate. That we are not progressing in the art of decorating is quite certain. We would, therefore, point to this roof of the Chapel Royal as an example in principle to go by of fine-art and artistic decoration. A partial success, for what a pity it is that the woodwork and stone surface of this noble hall should be so disfigured as they are, and choked up with common paint and trumpery gilding, killing the paintings! This is one mode of painting or decorating a roof. For the reverse of this system of art-production, we may instance the flat, ungainly, and sound-destroying roof of Exeter Hall, from which it would almost seem the hint has been taken for decorating the roof of St. Paul's, for they are both alike the produce of the shop-decorator, and such work may, as everybody knows, be bought like paper-hangings. Indeed, it may very fairly be questioned whether the art of paper-*printing* and hanging,—somewhat despised though it be,—is not the finer art of the two. What is now doing in St. Paul's is of this latter Exeter Hall type of art. What we suggest as the true and real way of work is that of the Rubens and Chapel Royal type, as far as it has been accomplished. We would ask the reader who is sufficiently interested to go to both buildings, and, looking well at them, to balance the loss and gain, and to mentally compare them, and to declare which is best to go by, the art-manufacture of the one, or the real and true art, the painting in its true sense of the other. No *artist* can for one moment hesitate; and it does seem something quite marvellous that there should be in this country such an institution as the Royal Academy, and for it to be passed by without a thought, and some London shop entered, wherein to find the art-power to cover the roof and walls of such a building! It would be, indeed, impossible to overrate the value and importance of filling St. Paul's with painted glass and pictures worthy of the place they decorate. We do not hesitate to say that it is not at all inferior to the exhibition of pictures in the National Gallery, even if it be not superior to it, as an art influence, for it would show to the public what the object of high art and painting is, and what they are capable of doing. One of the great objects of St. Paul's is to read to the public the sacred stories and wise teachings of that great and wonderful book, the Bible, and it is considered as one of the proud things which England does, to do this, day by day, without pause or interruption: ought it not, therefore, to be one of the objects of those who have it as their duty, to supplement this daily oral teaching by the ocular teaching of pictured representations of those very stories and scenes which are read of? No one, probably, will be found to deny this, but the great question then comes, who is to do it? Is it to be a mere matter of business merely, like the decoration of a music-hall, or a theatre, or a fashionable room? This is the whole question, for no one, we presume, can or will defend the work which has been put up by way of "docoration" on the ceiling of the east end of the choir immediately over the windows of the apse of St. Paul's. Who is he, therefore, or are they, who should be called on to do this work? There can be but one answer. He or they should be selected from the ranks of that body which represents the picked men, as artists, of modern England, viz., the members and associates, and may be the students, of the Royal Academy. If the Royal Academy represents, as we are so often told it does, the high-art producing power of the time, and includes within its body not only the best and highest of artistic power, then it logically follows that out of its body must be found those who are most worthy to do such work as this. Will they do it, if called upon; and will the committee of the St. Paul's Restoration Fund call upon them to do this work? Our own conviction is, that it would be far better, and a far nobler work, to decorate or cover with real and *bonâ-fide* painting the *choir* of St. Paul's only, and to expend the whole of the money in the hands of, or promised to, the committee in this sole work, than to cover the whole of St. Paul's ceiling, walls, and even floor, with mere art-manufactured work, which may be, as all know, bought over the counter like paper-hangings and printed calico window-curtains.

It is not for us perhaps to prognosticate as to the *how* this great work should be gone about, or as to the probable nature of the result; but judging of it by the light of those works which have been seen by all from the heads and hands,—we repeat the *hands*,—of Millais, Holman Hunt, and others; then may we confidently affirm that painting, worthy of the building, and truly decorative and instructive, would result. No mere supply of sketches or "cartoons," be it understood, is here meant for *other and inferior hands to execute*; but these paintings, we are suggesting, shall be the sole work of the painters themselves, just as much so as the "Chill October" and the "Scape-goat." This is what is meant by "painting," no matter where it is or on what material, whether stone or glass. A "Crucifixion" on a surface of glass is to the full as difficult, and requires as much art power in its way, as does the same subject on paper or on canvass. The general idea, the composition, the drawing, the actual painting, the life in it and expression of the individual figures and faces, and all else, are to the full as difficult and as much the work of a great artist, and equally demand artistic power of the highest order the time and country can produce. We are supposing and suggesting that the work shall in the first instance be confined to the choir only, and the three windows in the apse,—not the upper or clearstory ones, for it may well be a question whether or no it would not be a judicious thing to hang silk drapery over these windows, so as not to interfere with the full effect of the lower and more important ones. The upper window, now filled with glass, which lets in a good deal of clear daylight, "puts out" the lower and more sombre ones below. We are also supposing that the whole of the stone surface throughout the cathedral, doorways and all, shall be cleaned clear of their successive coatings of common oil colour, and the pure and nature-coloured stone surface made visible. *This simple process in itself is decorating St. Paul's*,—Nature's decoration. We must also suppose the whole of the poor and shabby gilding, inexpressive of anything as it is, gone, and cleaned off from the carved work and mouldings. Thus we should have at least two good things in St. Paul's,—first, *Nature's own decoration*, the ever-varied stone-coloured surface of the walls, and piers, and arches growing ever dimmer and more harmonious by time, and offering a clear and bell-like surface for the sound from the voices of the choir and organ-pipes; and, secondly, we should have, a little of it at least, some real and genuine "painting" on the clean plaster ceiling, or, perhaps better, on canvass, as at Whitehall; and then there may come windows, good, as far as the art power of the present age can produce them. More, of course, we cannot have.

TILE AND CEMENT ROOFS.

IN view of the part played by the roofs of the Chicago houses in spreading fire, attention has been directed to means of rendering this part of buildings less combustible than it is at present; and in our last issue, Mr. William Ifold invited us to describe the inexpensive mode of roofing adopted by Messrs. Corbett & McClymont, on the Redcliffe Estate, South Kensington. We willingly comply, and give a section of one of the roofs, showing the construction. Arched ribs are placed from party-wall to party-wall, resting on stone corbels; boarding is laid on the ribs, and then two, or in some cases three, courses of plain tiles are laid in cement, the surface of the tiling and the face of the party-walls being afterwards rendered with Portland cement and sand. A stout plaster ceiling shuts all in below. Good workmanship is necessary; and care should be taken to prevent settlements in the walls.

Such roofs are not a novelty; they have been used here and there for some years past, but not to the extent to which they have been adopted by Messrs. Corbett & M'Clymont. There is a



Section of Roofs on the Redcliffe Estate.

trap-door in each to facilitate escape in the event of fire, and this ought to be of slate or some other incombustible material.

A modification of this arrangement, by which the use of woodwork should be altogether avoided, would be an improvement. We add the builders' own specification:—

Construct ribs as per sketch to form roof, and to be fixed not more than 2 ft. 2 in. apart, and on 4 in. stone templates as shown. Lay over same 1 in. rough boarding 4 in. wide, and ½ in. apart. Lay two or more courses of sole tiles in Portland cement over the whole, and float over the surface with Portland cement and sharp sand in proportions of three to one.

A correspondent mentions that in Stockholm a fire never extends beyond the house in which it originates, as the roof is invariably of brick or stone.

ST. BARTHOLOMEW'S HOSPITAL SURVEYORSHIP.

ON Tuesday last the committee of governors selected the names of three of the candidates who are to be returned to a general meeting to be held on the 18th inst., when the election will take place. The names selected were those of Mr. Edward I'Anson, Mr. E. N. Clifton, and Mr. Frederick Marrable, in the order in which we have placed them. The other candidates were Mr. Charles Barry, Mr. W. Gardiner, Mr. W. F. Meakin, Mr. Henry Hunt, jun., Mr. Richard Bell, Mr. W. M. Teulon, and Mr. Henry Dawson.

ARCHITECTS' COMMISSIONS.

Two anonymous correspondents of the *Nottingham Daily Express* have asserted that the architects of that town "are in the habit of receiving commissions from timber dealers and others who thus buy their custom and their certificates of the soundness of materials." Mr. Sidney R. Stevenson, architect, in the same journal, repudiates the assertion:—

"To the ungenerous and sweeping charge [he writes] that architects of Nottingham resort to dishonest means, I have only to say that it is not true. There are men who resort to all sorts of schemes to build, or do anything else without paying a fair price for professional talent, and who, instead of placing themselves in the hands of men who are above the reach of being tempted to trickery, employ some 'go between,' and thus in the end pay dearly for their experiment. I hope the 'Two Freeholders' are not of this category. The time has gone by for professional men to make exorbitant charges continuously. If there are those who make it a rule to 'bleed' their clients, it is some consolation for those who do not do so, to know that the chance is not often repeated of giving a second dose."

THE SANITARY CONDITION OF SCARBOROUGH.

THOSE who have authority in Scarborough and are interested in its well-being should take into immediate consideration its sanitary condition. Mr. G. P. Dale, F.R.C.S., who has been endeavouring to remove a stigma from Londesborough Lodge, has thrown a lime-light into the ordinary lodging-houses of Scarborough. Mr. Dale writes:—

"Those of your readers who have had experience of the sanitary appliances of lodging-houses in watering-places will recall many cases of sickness corroborating these statements. In the hottest months of the year, when these houses are overcrowded with inmates, a break-down happens. The effluvium is at such times so offensive to the senses, that nausea, sickness, or diarrhœa immediately follows; the whole household is stricken down. There the evil, such as it is, ends. I cannot recall one instance of such illness ending in typhoid or other allied fever. *These cases are of daily occurrence during 'the season.' Hardly one house escapes*, yet I can affirm that during twenty years' practice in Scarborough, I have not seen twenty cases of typhoid fever."

He gives his example, of course, from Scarborough, and a pretty state of things his statement points to. The matter should be officially inquired into, and the evils thoroughly combated, if the people of Scarborough wish their gay place to remain in favour.

In striking confirmation of the impression thus conveyed, Mr. William Cadman writes,—"Three times I have called the attention of the Scarborough authorities to their manure depôt. The sad and much-to-be-lamented result of the Prince of Wales's visit will—yes, must—rouse them. Scarborough (I believe I may say) is seldom, if ever, free from fever. Now, all the filth, ashes, &c., from the town, which must contain the poison generated by sewage, is carted through the town, and deposited about half a mile, or a little more, in the valley above Lord Londesborough's lodge. The wind is mostly down or up this valley. When down, the poison must pass into and about Londesborough Lodge. The Convalescent Hospital is also very near this depôt, and the immediate neighbourhood is seldom, if ever, free from fever. Any one having to drive to Seamer must pass this depôt. The Londesborough party had to do so, and must have felt the sickening effect. Also a dreadful smell ascends from the drain along the sands past the Grand Hotel. This effluvium, with an easterly wind, must ascend to Londesborough Lodge; the westerly wind bringing the poison from the depôt."

Mr. Dale and the professional gentlemen acting with him, who say, apparently with much satisfaction, that the fall of the drains in Londesborough Lodge to the main sewer "is very great," show that the arrangement is eminently qualified to discharge the sewer gases into the house: in fact, if the drains are not ventilated externally,—and we do not hear that this is the case,—that result at times cannot be avoided. No one for an instant thinks of attaching the slightest blame to Lord Londesborough, or to insinuate that his house is any worse than scores of others. It is of the utmost importance that the truth should be arrived at.

A REVIVER FOR SOUTHAMPTON.

THE great, or what should be the great, southern port of the United Kingdom; the home station of the splendid fleet of ocean-going steamers of the Peninsular and Oriental Steam Shipping Company; the despatching post-office for India and other quarters of the globe, is not thriving, and the reasons of its threatened decline are not far to seek or difficult to find. Its intercourse with Manchester and the manufacturing districts is round by London. Its coal and iron are, for the greater part, carried to it by sea; the passage long, and not seldom very rough, sometimes dangerous. Minerals and manufactured goods are heavily weighted when they reach the port with the costs of freight, and commercial and shipping interests suffer in consequence. The high price of coal deters owners and captains of vessels from coaling there,—almost hinders them, indeed, from using the port. Ships that have arrived inward with cargoes, have to depart outwards in ballast, when their owners would gladly take cargoes,—whole or part,—in coal, iron, or manufactured goods; but those that have to ship these products are deterred from sending them to Southampton for shipment by the difficulties, detentions, uncertainty, and costliness of conveying consignments thither. A remedy for these disadvantages has always been held to be direct railway communication between Southampton and the localities with which it desires to have facilities for commercial intercourse. Twenty-six years since a direct line to Manchester was projected, but thrown out on third reading in the House of Lords, after it had passed the committees of both Houses, and after it had involved the promoters in costs amounting to 180,000*l*. Ever since then the inhabitants have been discussing the subject, and often fighting, in Parliament and out of it, to obtain their object, but hitherto without success. The inhabitants are again "much exercised" concerning this great commercial and social need. A requisition to the mayor, signed by above 600 of the most influential inhabitants, resulted recently in an enthusiastic meeting in the Guildhall, at which resolutions were passed with great enthusiasm, pledging those present to support a direct line to South Wales,—which also shortens the distance greatly to many other places and districts,—that has been laid out by Mr. James Brunlees and Mr. Arthur Pain, engineers. The line, it is stated, has been laid out by the route least likely to cause competition with the great companies that claim the territory, but disclaim the obligation to give to the people of Southampton the railway accommodation that is of almost vital importance to them. It is to be feared that when the promoters get into Parliament they will find themselves as did the lamb with the wolf in old Æsop; whether they drink up stream or down, they will be set upon for troubling the water.

The proposed line is to commence in the South Wales coal-field; to cross the Severn at a point about midway between Gloucester and Bristol, by a high-level bridge, of nearly three-quarters of a mile in length, with 120 ft. of waterway. On the south of the Severn the line will proceed in a south-easterly direction, but with a spur thrown northwards from Malmesbury to Nailsworth, to meet the traffic from Birmingham, Manchester, and the North. The main line of the South Midland will cross the Midland at Berkeley Docks, and will cross the Great Western at Wootton Bassett and Hungerford, where the line forks,—one spur running on to the South-Western at Basingstoke, the other proceeding southwards to Andover. The promoters will apply for running powers over the South-Western between Andover and Southampton, and, in return, will give that company access to the South Wales coal-fields, from which it has hitherto been shut out.

The distances saved by the proposed route would be 43 miles between Cardiff and Southampton, 21 miles between Manchester and Southampton, and 17 miles between Cardiff and London.

The scheme has the old-fashioned honest paternity of the railway projects of early days: there is no scheming or dodging about it: all is open and above-board. It is believed to be as promising as it is thoroughly sound; and it is to be hoped, in the interests of fair play, that the promoters may be able to hold their own against all comers; may obtain their Act; and that Southampton, instead of falling into decay, may become, ere many years elapse, the Liverpool of the South of England.

SURVEYORS UNDER THE DILAPIDATIONS ACT AND APPRAISEMENT STAMPS.

IN reply to an inquiry made by Mr. E. G. Bruton, the Assistant Secretary of the Inland Revenue Office has been directed to say "that a surveyor appointed for a diocese under the 'Ecclesiastical Dilapidations Act, 1871,' is not an Appraiser within the meaning of the Stamp Act, 1870,' and is not bound to make his report on an appraisement stamp."

MANCHESTER FREE LIBRARIES.

THE nineteenth annual report of the Manchester Free Libraries has just made its appearance, and contains many interesting facts illustrative of the growth of these institutions. A beginning was made with a reference library and one lending library. The reference library had then 16,000 volumes. It has been greatly extended and enriched, and now contains upwards of 45,000 volumes, including many books of great value. The single lending library has been multiplied by six, and a seventh is in progress. The 5,300 volumes appropriated to circulation in 1852 have increased to 60,573 volumes in 1871,—that is, the libraries possess 105,666 volumes in all the departments. The six departments, which include a public reading and news room, at each lending library, engage the services of thirty-seven heads of departments and assistants, including nine female assistants. During the last year the libraries have been used by about 2,112,900 persons, of whom 420,249 have taken books to their homes, 136,238 have read books in the lending library reading-room, 59,385 have used the reference library presumably for study and research, and about 1,495,000 have availed themselves of the privilege of perusing the newspapers, periodicals, and other publications, for the use of which no application is required, admission being absolutely free, without questions asked. During the last year 6,682 volumes have been added to the libraries, of which 5,861 were purchased, and 821 presented. In evidence that books are not purchased to stand undisturbed upon the shelves, it may be mentioned, that during the last year 1,952 volumes were withdrawn from circulation as "worn out." In the first year from the opening of the library, the aggregate issue was 138,312 volumes, or a daily average of 461 volumes. Last year the aggregate average issue was 917,163 volumes, or a daily average of 3,185, or nearly 270 volumes in the hour. The aggregate number of volumes applied for during the year has been 917,613, of which 506,199 were taken home, 147,323 read in the branch reading-rooms, 92,594 were given out in the reference library, with 171,497 specifications of patents.

The Reference Library is supplied with 155 periodical and serial publications, transactions, &c., many of which are presented by societies and publishers.

The lending library reading stands and tables are liberally supplied with newspapers and magazines. In one of these rooms there are taken in daily, 33 copies of daily papers, 3 twice a week

papers, 48 weekly papers, and 54 monthly publications. Occasional copies are contributed, or procured, of 35 others. From the same department 39 different periodicals are lent to borrowers: these include the *Atlantic Monthly*, *Blackwood's Magazine*, the *Builder*, the *Cornhill Magazine*, the *Dublin*, *Edinburgh*, *Fortnightly*, *London Quarterly*, *Quarterly*, and *Westminster Reviews*; *Fraser's*, *Gentleman's*, *People's*, *St. James's*, *St. Paul's*, *Sunday*, and *Temple Bar* magazines; with many other excellent publications. This great boon is highly prized, and taken advantage of extensively. The monthly publications are issued on an average eight times per month, and the reviews about twelve times in each quarter.

The supply of mental pabulum thus provided for all classes in or near Manchester is more generous and of more easy access than the people of any other city and town in the United Kingdom,—it may almost be said on the face of the earth,—are favoured with.

SMOKE DRAINAGE.

MR. B. W. GIBSONE sends us a letter of his, printed elsewhere, inquiring, as others have inquired before in our pages, why houses should not be built with downward flues terminating in the water-drains. He says:—"Connect your drains of any district or block of houses with a ventilating furnace having a lofty ornamental shaft, and you at once obtain (availing yourself of the inverted syphon) the motive current of air, and a means of destroying the noxious gases of our underground system, while the central furnace would supply warm air or water, or even gas, to all the contiguous dwellings, and the heavy fuliginous matters would be condensed chiefly in the sewers."

Amongst the advantages the writer notes:—

1. Absence of smoke in a city atmosphere.
2. Diminution of cost in construction of various chimney stacks.
3. Absence of architectural disfigurements, such as zinc cowls and red cylindric pots.
4. Saving of fuel by total consumption of the smoke in the grate, the fire burning downwards, instead of upwards.
5. Greater ease in cleansing the flue from soot, and in the removal of ashes.
6. Steadiness and irreversibility of air-draught, and power of thoroughly ventilating a room, even when unfurnished with a fire.

Many years have passed since a similar proposition was first made, and plans and models were then prepared to show how the arrangement could be carried out.

The objections to it, however, are so strong, that it is not likely it will soon be put to a practical test. Few men would be brave enough to take a house, the comfort of which depended on the constantly successful issue of combined action over which he had no control. The accumulation of soot in the drains, notwithstanding the more complete combustion suggested as being obtainable, would interpose another considerable difficulty.

LANDLORD LAW AND PUBLIC HEALTH.

SIR,—In common with many of your readers, I was much disappointed at seeing the present state of the law with respect to the relations between landlord and tenant as laid down by Mr. E. L. Tarbuck (p. 892). I will not speak of the legal paradox of making a man pay *rent* to the termination of a lease for premises which had been blown up or burnt, or, it may be, had fallen down! If such be the common law of England, the sooner some statute is enacted for specific liquidation of onerous obligations on this question the better for us all, landlord and tenant included.

This, however, is not my principal object in taking up the cudgel. Here is my practical complaint (I quote from Mr. Tarbuck):—

"*Neither is a tenant free to execute essential work and deduct the cost from rent accruing due to his landlord, even where the latter has agreed to do repairs, and neglected them; the remedy against him then being by action of assumpsit, or for breach of contract.*"

Now, let us consider this position for a moment, supposing it to be correct, as regards its bearing on the public health. No essential repairs, it seems, are to be initiated by the tenant. How far, then, does the principle apply? What is an essential repair? Who is the judge in the first instance? Will any of your legal readers assert that I must bring an action of *assumpsit* against my landlord for a chimney-can or a slate, which I think is every moment likely to topple off my roof, and cleave my skull? Must I bring an action for breach of contract in place of ordering a gutter to be repaired which endangers my parapet; or still worse, a burst pipe which is sapping my foundations? The thing is absurd. I still say nothing of a rotten soil-pipe, or a foul and filthy water-closet, which will certainly create typhoid fever or something of a more malignant character, if not properly looked after. And yet I know perfectly well that no class of repairs are so much "agreed to" by landlords, and, at the same time, so much "neglected by them." A. M.

*** Every lease ought to contain a proviso for the cesser of rent, in case the premises should be destroyed, as by fire, until such time as the landlord has properly rebuilt or restored the same; should this proviso have been omitted, the tenant has no means of escaping from the payment of rent even during the time that the premises remain uninhabitable.

PUBLIC BUILDINGS.

IF the International Exhibition is to be a permanent affair, may not the "British public" ask that there may be a little more architectural display externally, and a little better arrangement internally? The present barn-like building seems to have been built rather as a boundary-wall to the Horticultural Gardens than as a structure of national or international importance.

When the building of '62 was erected there was a great outcry against Captain Fowke for his design, although it was held by many to have fine features, so that, if finished as he intended (*vide* the plans in the Royal Academy that year), it would have made a noble building. Are there *many* now who, capable of judging, can conscientiously call the present design and execution *superior* to his? There is nothing noble in it, it is dwarfed and shed-like. It seems but a very humble dependent of the noble hall that forms one of its entrances. Is expense the cause? Or do they intend to erect a nobler building?

Again, will the nation be satisfied with the proposed elevation of the New Law Courts? Will the design suit the situation? Is it externally of the bold proportions and stately appearance a building of this description should possess? The design seems to me to better befit the country to stand in grounds as an asylum than the purpose it is appropriated to.

I for one would like to be proud of the public buildings we of the nineteenth century leave to our prosperity to compare with Wren and other earlier architects of note. G. S.

SANITARY MATTERS IN IRELAND.

THE chronic neglect of sanitary measures is bearing its inevitable fruits in the Irish capital, and in other towns throughout Ireland. Small-pox is still in the ascendant, and is not confined to the poor quarters of the city, but has laid hold of dwellings in the more fashionable quarters. This the leading journals of Dublin acknowledge, and are beginning at last to attribute it to corporate supineness and indifference.

Dr. Grimshaw has just read a paper before the College of Physicians. In his remarks upon "Sanitary Reform," he took occasion to refer to the various Acts now in force in Ireland bearing upon the subject, and showed with what powers the Irish executive were invested by the passing of these Acts and their incorporation. Notwithstanding these powers, the municipal authorities of Dublin pursue their old course of half-measures or no measures, and the Castle authorities also rest upon their oars. The police authorities in Palace-yard, and the civic authorities at the City Hall,—both next-door neighbours,—are agreed upon one thing, and are quite unanimous in doing it,—this is simply *nothing*. The minor sanitary officials of the corporation do a little, but they seem to be acting in restraint under their superiors. Now and then, an unlucky butcher or bacon-seller is hauled up before the authorities for vending unsound meat, and once or twice in a month the owner of a human piggery is cautioned or fined; but the delinquents in several cases bear the fines with true Milesian equanimity, and go on still sinning.

The police-courts are often the scene of a legal battle between opposing attorneys,—the nuisance in the meantime existing, and furnishing plenty of practice for the hospitals and the merry undertakers.

The Gas Company of Dublin is also playing fast and loose with the feelings of the citizens, and the directors are apparently adepts in the matters of "light and shade." A few days since a penalty was enforced against them for throwing too much shade upon the night-side of Dublin, but their picture in this instance was a scarcely less illuminated one than their former efforts in the same line.

"Dear, dirty Dublin," is a saying not more alliterative than true; but Dublin, with all her dirt, possesses much beauty in face and form, which could be seen to advantage if her guardians were compelled by law to do their obvious duties in the preservation of her character and regulations. They leave her in dirt, however, and her health and that of her population suffer accordingly, and will bear further unhappy results.

COTTAGE HOSPITALS.

Tewkesbury.—The success attending the cottage hospital scheme, and the grateful readiness with which the poor have availed themselves of its benefits, have induced the governors to provide a building of a plain character, especially adapted to the purposes of the institution, and which shall be so arranged as to provide accommodation not to be met with in any ordinary cottage, however otherwise suitable. A portion of land was obtained for a site near the present cottage hospital, and plans for the erection of a building of the kind required at an estimated outlay of 1,100*l.*, received from Mr. Middleton, of Cheltenham, the appointed architect, and approved of. The tender of Messrs. Collins & Cullis, builders, was accepted, and an amount subscribed towards the building capital, which justified the committee in at once commencing with the work. The ceremony of formally laying the foundation-stone has just been performed by the president of the institution, Mr. John Surman, in the presence of a numerous assembly. The new building will be in the Early English style; of brick, with Bath stone dressings. Provision will be made for eight beds; there will be four wards, including a convalescent ward, and the requisite accommodation for the surgeon. A board-room will also be provided, together with the usual offices and sleeping and other apartments for attendants.

THEATRES.

Opening of a New Theatre in Hull.—The New Theatre Royal, in Paragon-street, Hull, which has been entirely rebuilt, under the direction of Mr. Sefton Parry, has been opened to the public. The building is erected on part of the site of the old Queen's Theatre, about two minutes' walk from the railway station, and is at once commodious and in the most easily accessible part of the town. The façade of the Theatre Royal is called of Classical design, with large pilasters, surmounted on pedestal bases, with large composite capitals and cornices, with a pediment over the middle pilasters. The interior is similar in shape and design to the Globe Theatre in London, and will hold 1,200 persons. Every appliance that can possibly conduce to the convenience and enjoyment of the visitor, it is said, has been studied; and while the ventilation of the building will be perfect, there will be a total absence of draughts. There are suitable ante-rooms and refreshment-bars, and the speedy clearance of the house in the event of a panic has been provided for. Mr. G. A. Middlemiss, of Sunderland, was the architect.

Burning of an Australian Theatre.—The Haymarket Theatre, Melbourne, after a short life of feverish excitement, mingled with long seasons of intense depression, has been destroyed by fire. The building, with the exception of a portion of the frontage, converted into a public-house, was unoccupied. The fire is believed to have broken out in the kitchen of the tavern. In a few minutes it had obtained such a hold upon the auditorium that any hope of extinguishing it was futile, and the efforts of the firemen were confined to preventing the fire from extending to the neighbouring houses. Every portion of the theatre and vestibule was destroyed, excepting the outside walls, and there is no probability of any attempt being made to resuscitate a place of

amusement which was a financial and artistic failure. Jefferson, Mr. and Mrs. Charles Kean, Lady Don, Madame Celeste, and several operatic celebrities, performed in this theatre.

THE TRADES MOVEMENT.

Sheffield: Carpenters' and Joiners' Board of Arbitration and Conciliation.—The delegates of the carpenters and joiners of Sheffield and the district have adopted a code of proposed arbitration rules, and in forwarding a copy to each employer they say:—

"We hope that you will use your influence in trying to form a Board of Arbitration with the other employers of carpenters and joiners, and prevent us from having to resort to other means to gain that object which we have given ample notice for, namely, the reduction of working hours and advance of wages. We hope that you will see the necessity of joining with us to bring this matter to a satisfactory termination to all concerned."

The Board is to be styled the "Board of Arbitration and Conciliation for the Carpenters and Joiners of Sheffield and District," and the object of the Board will be to arbitrate on any question relating to wages, working rules, and any other matters that may be referred to it from time to time by employers and employed; and by conciliatory means to interpose its influence to prevent and settle any disputes. The Board is to consist of eight employers and eight operatives, and the whole of the deputies shall serve for one year, and be eligible for re-election. The Board is to have full power to settle any disputes that may arise from time to time, and the decision of the said Board shall be binding on all parties concerned. A sub-committee to be formed to inquire into all cases of dispute, and, if possible, to settle the same; but such settlement, to be binding on either party, must have the approval of the General Council. Such sub-committee shall consist of the two secretaries, two employers, and two operatives, selected by the secretaries, from time to time as occasion requires, from the members of the General Council. Any expenses incurred by the Board to be borne equally by the employers and employed.

A "GOOD TEMPLARS'" HALL, OF CONCRETE, AT WORKINGTON.

The foundation-stone of a Temperance Hall has been laid at Workington. The site of the proposed building is near to St. Michael's Church, adjoining Station-road. The building itself, which has been designed by Mr. Eaglesfield, of Maryport, architect, is to be 60 ft. by 46 ft., and when completed, will have on the ground floor a lodge-room, 30 ft. by 30 ft., a reading-room, an ante-room, a kitchen, and a room for the person appointed to look after the building. There will also be two underground rooms. The upper story is to consist of a large room fitted up with a platform, and capable of accommodating 900 persons. The principal entrance to the building will face a new street which is about to be made, and there will be another entrance opening into Station-road. The estimated cost of the hall, which will be built of concrete, is about 1,200*l*. The contract for the erection of the building and the whole of the woodwork in connexion with it, has been let to Mr. R. W. Schofield, of Workington, who has undertaken to finish his part of the work by the 26th of May next.

INFIRMARY AND DISPENSARY, SHOREDITCH.

This building is being erected at the angle of Hoxton High-street and Reeves-place, and is an extension of the workhouse, which was built about nine years ago. Its length is about 164 ft., and breadth 27 ft.; the height is 54 ft. The ground-floor is devoted to the dispensary, waiting-room, consulting-rooms, surgery, and necessary stores. The upper floors are divided into two wards, 72 ft. by 24 ft. each, with the necessary conveniences, nurses' rooms, &c., ventilated by air-gratings and hoppers formed in the sashes, also by the Galton stoves. Accommodation is provided for 150 beds.

Doctors' rooms, also rooms for matron and assistants, and convalescent rooms for men and women are provided on the upper floors by raising the existing adjoining buildings. It is faced with Gault bricks, Fareham bricks being used for the arches and strings. Greenmoor stone is used for the sills and all interior work, and Portland for the porches, the columns being Red Mansfield.

The works are being carried out under the architect, Mr. William Lee, Gresham-buildings, by Messrs. Hill, Keddell, & Waldram, at a cost of 11,000*l*.

VENTILATION OF SOIL PIPES.

Sir,—We have read a great deal of late respecting the great importance of proper ventilation of house-drains so as to prevent the accumulation of foul air beneath the house, which is the cause of more disease than any other. I find that the Local Board at Croydon makes it compulsory that all houses shall have an air-pipe from the highest part of the drains (say at the rear of the house), which shall be carried up above the highest window, so that no accumulation shall take place beneath the house; but there is one point of great importance which I find is seldom attended to, and that is the ventilation of the soil-pipe from the water-closets, where they are not connected with the rain-water pipes. The water-closets are often placed inside the house, and in large houses on every floor, without any air-pipe on to the roof; the result often is the foul air rises through the trap of the closet, often causing disease and death. I believe the want of this air-pipe to be a very great evil, and hope the time is not far distant when the placing it in connexion with the soil-pipe, will be made compulsory.

E. O. S.

THE FOREIGN MISSION COLLEGE, MILL HILL, MIDDLESEX.

The College of St. Joseph, at Mill-hill, near Hendon, which forms the subject of our illustration, is destined for the education of Roman Catholic missionaries to serve in the British colonies. It has been erected from the designs of Messrs. Goldie & Child, architects, and is in a freely-treated style of architecture, consistent with the materials used, local stock bricks, with dressings and bands of red and black bricks, stone being sparely used throughout. The plan comprises two wings, forming two sides of a quadrangle, and connected with the church by a cloister. On the ground-floor are a spacious library, refectory, and recreation and lecture rooms, with parlours for visitors opening on to a wide cloister paved with encaustic tiles. The kitchen offices are to the rear. On the upper floor are the students' sleeping apartments, opening right and left from a corridor extending the entire length of each window, and giving thorough ventilation to the building. On the first-floor is an infirmary, separated from the rest of the house by a screen, and provided with a window opening into the church, to enable the sick to assist at the divine offices. There is accommodation for 100 students, besides the superior, his assistants, and the professors.

The college is now completed, and the church, forming the fourth side of the quadrangle, is in course of erection. It will consist of a nave, with flanking side chapels terminating in a semicircular apse, with surrounding aisle; a lofty belfry will rise from the end of the cloister adjoining the church, while a spacious sacristy will be provided on the opposite side. The church, besides the students and inmates of the college, will be opened to strangers, who will occupy a portion of the nave.

ORGAN-LOFT IN THE CHURCH OF ST. PANTALEON, IN COLOGNE.

Not many English visitors find their way to the neglected Church of St. Pantaleon, in Cologne. Amongst such superb ecclesiastical edifices as the great Minster of that city, and the churches of St. Mary in the Capitol, St. Gereon, St. Martin, and St. Cunibert, it is not to be wondered at that this out-of-the-way and forlorn church is overlooked; and yet in any less wonderful city than Cologne the Church of St. Pantaleon would assuredly not pass unnoticed.

The Church of St. Pantaleon now forms the garrison church for the Prussian regiments stationed at Cologne, and in order to satisfy the spiritual wants of this body, the church changes its religion twice every Sunday; that is to say, early in the morning it is used for the Roman Catholic services, and at noon for those of the Augsburg Confession. It is, of course, the immediate property of the Prussian Government, and it is not creditable to such a great and wealthy Government that the church which is their private property should be the only neglected one in the whole town. Surely one might expect that when the city of Cologne has set such a brilliant example of liberality in the superb works being now carried out in connexion with the cathedral and townhall of that city, and where the liberality of private individuals has produced such fruits as the restoration of St. Mary in the Capitol, St. Gereon, and St. Martin, the Government might be expected to keep its garrison church in tolerable repair and free from filth.

The Church of St. Pantaleon is a large cruciform building, consisting of a nave of great width (nearly 37 ft. in the clear), with narrow aisles and low transepts of Romanesque work; to the east is a spacious chancel, with a Third Pointed apse and side-chapels, and to the west a very solid Romanesque tower, much modernised and crowned by what was originally a lofty bulb-shaped spire, but is now an ill-formed mass of timber and slate. Attached to the south side of this church there existed, until a few years ago, a most interesting cloister of very singular and most valuable Romanesque work; but after having, through many years of inexcusable neglect, fallen into ruin, it was at length pulled down, and only very slight traces of it are now to be seen adjoining the south wall of the church.

The earliest portion of the existing building is the narthex or porch under the tower. The church of which this formed a part, and of which also the existing nave *may* have formed a portion, was consecrated in the year 980. The transepts are much later work, and although Romanesque in character, probably are not earlier than the 13th century. The destroyed cloisters were of the very latest Romanesque work, and probably dated from about the year 1240 or 1250.

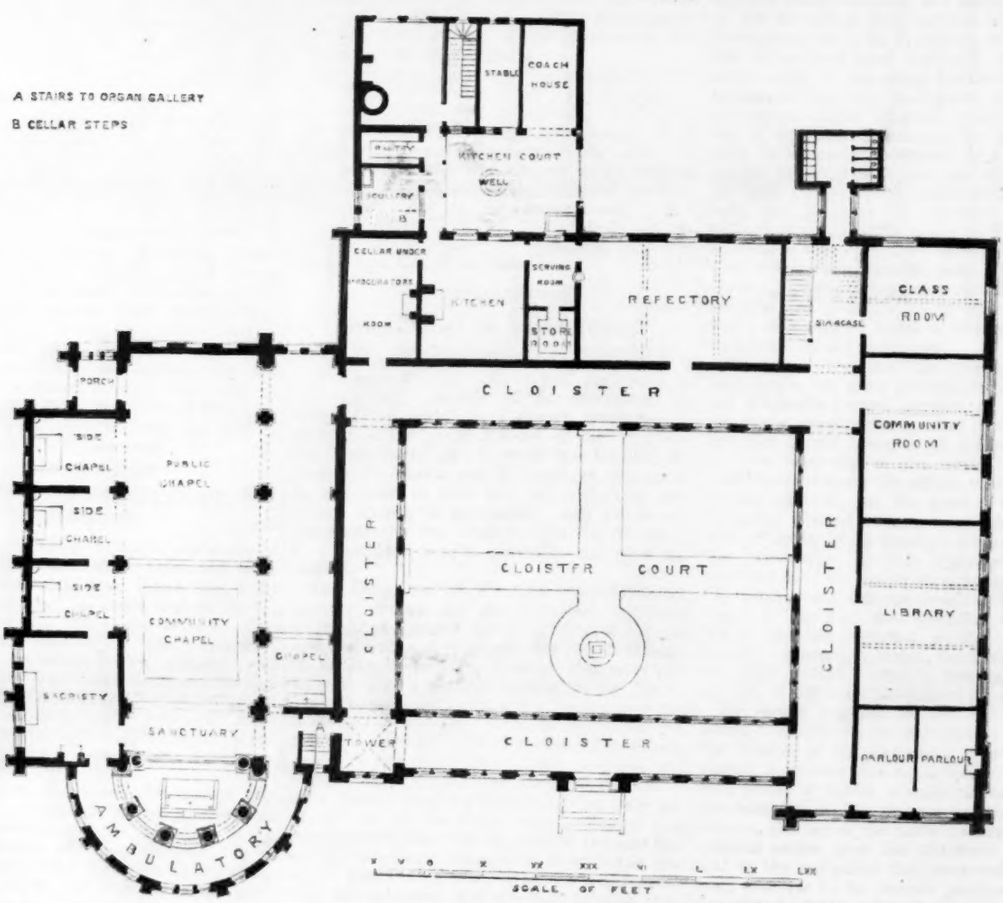
The interior of the Church of St. Pantaleon has been denuded of everything that could give it interest except the handsome organ-loft, of which we give an illustration, and some fine late glass in the three long windows of the apse.

As will be seen from our illustration, the organ-loft is of the latest Gothic work, and cannot be of an earlier date than the year 1480; probably it is even later than that. It is a work of the greatest delicacy and intricacy, but its construction is a singular example of the false method of working into which the late German architects were led by their excessive love of the wonderful. All these twisted and interpenetrating canopies and pinnacles which look so skilful, cease to astonish us, when we know that they are *so many little pieces of stone strung on copper wire!* Some people have even doubted whether these canopies are made of stone at all, but we can at once set this matter at rest, for the canopies at St. Pantaleon, which we were able to examine most carefully, are certainly stone. And at Augsburg Cathedral are some canopies of the same description, constructed of red marble. It is, however, possible that canopies of this description may be found in the north of Germany, composed of a composition (Gyps), as artificial stone was largely used in the Middle Ages in the neighbourhood of Luneberg, and portions of Hanover, a singular example of which is the series of figures of the Apostles in the aisles of St. Michael's at Hildesheim, which dates from the year 1186. We are, however, convinced that as a rule these twisted canopies and pinnacles are of stone; of course where they may be found of composition, they are always *carved*, never *cast*.

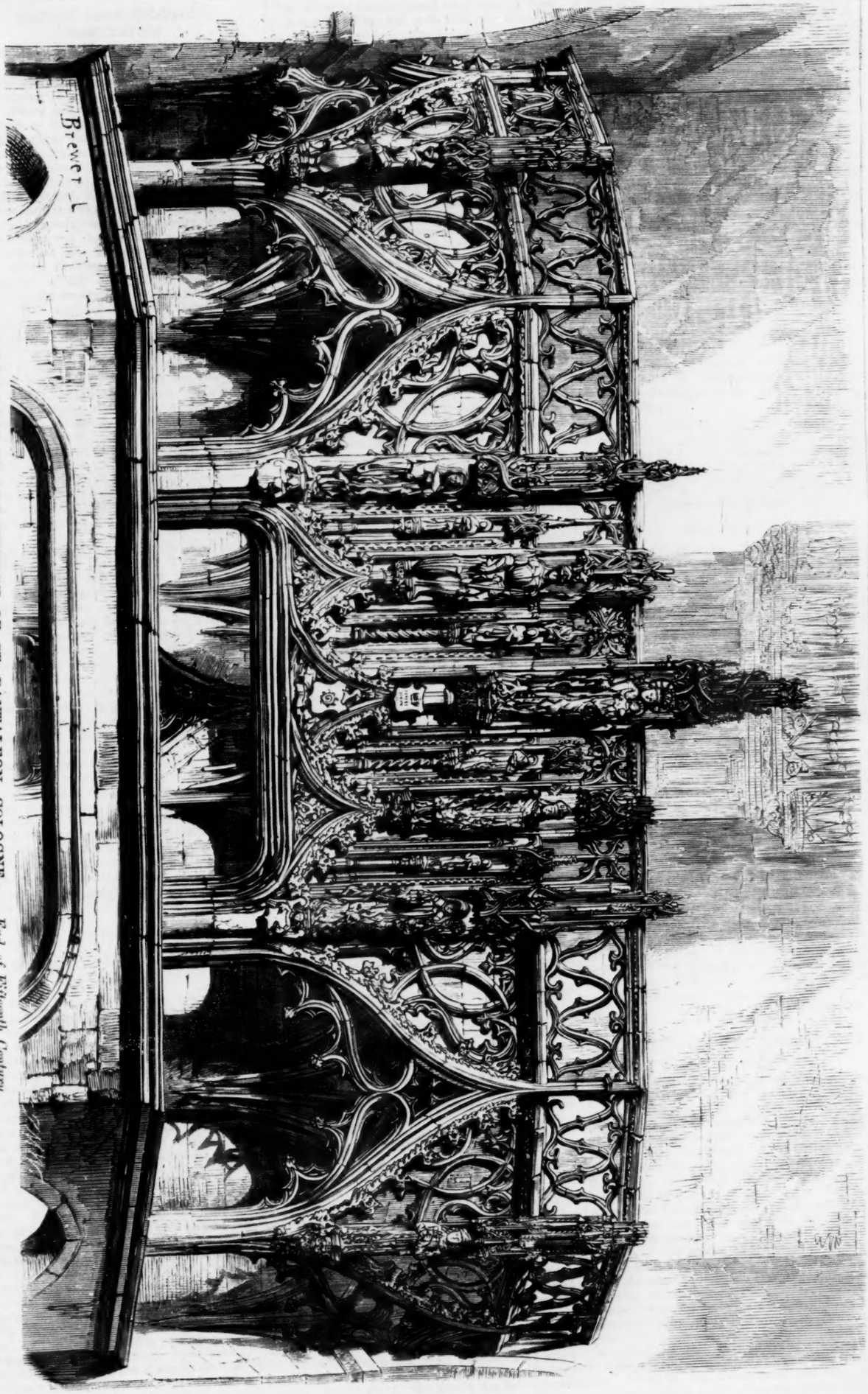
When we first saw the organ-loft at St. Pantaleon's, we were inclined to think that it had originally formed portion of a rood-loft, but closer examination proved to our satisfaction that it still occupies its original position, *i.e.*, the west end of the nave. During the seventeenth century the pillars which supported it were removed, and the present hideous substructure erected, which robs this charming work of much of its beauty; for however false the construction of this organ-loft may be, none can deny its beauty as a composition, and the delicacy and refinement of its details. We regret to say that this beautiful work of art shares the same neglect as the rest of the church. Scarcely a single finial remains perfect, and probably after a few more years of neglect, it will share the fate of the cloisters.

We would suggest to the Government of Berlin, that if they have no intention of restoring the Church of St. Pantaleon, it would be advisable to remove this organ-loft to the cathedral, where it would exactly fit in the place now occupied by the present temporary organ-loft, *i.e.*, the end of the north transept; and this removal would give the additional advantage, that in the cathedral this work could be well seen, whereas in its present position, owing to the church being very dark, and the great height at which it is placed, it is only seen with difficulty, and much of its beauty consequently lost.

THE FOREIGN MISSION COLLEGE, MILL HILL, MIDDLESEX.—Messrs. Goldie & Child, Architects.



Plan of Ground Floor.



ORGAN-LOFT IN THE CHURCH OF ST. PANTALEON, COLOGNE.—*End of Fifteenth Century.*

BRITISH ARCHÆOLOGICAL ASSOCIATION.

THE opening meeting, on the 22nd ult., the Rev. Canon Simpson in the chair, was distinguished by the announcement that the Society is arranging to move into larger rooms, where their library and museum can be properly used and seen by the associates.

A short paper was read by Mr. Edward Roberts, on the discovery and examination of what appears to be an ancient British cemetery (lately mentioned in our pages), on Sunbury Common, in the parish of Ashford, Middlesex, recently made by Mr. Leonard, the owner of the land, aided by the personal superintendence of three appointed members of the Association, and the liberal assistance of Mr. Thomas Ashby, of Staines, who, being desirous of preserving all local antiquities, kindly defrayed all the expenses attending the excavations necessary on the occasion. The result of two days' labour of the officers of the Association was the finding of a large number of very rudely-shaped urns, filled with the remains of burnt human bones, small pieces of charcoal, and a few calcined flints, but neither tools, coins, ornaments, nor weapons of any kind, although some pieces of flint bore some resemblance to arrow-heads, but failed, on examination, to betray the work of man. Six of these urns were exhibited to the associates, still containing untouched remains within them.

They were all made of a rough kind of clay and two kinds of paste, and had the appearance of being burned on the spot,—that is, over the bones whilst at red heat, so that the earth around had served apparently the purposes of a kiln.

One particular feature in the discovery, remarked upon by Mr. George R. Wright, who, with Mr. Black, had assisted in taking these urns from the earth, was the absence of any barrow above the cemetery, the land around being very flat, and apparently on a level with the Thames, which is about a mile and a half distant from the spot. To this Mr. Syer Cuming observed there were many instances on record of all traces of the barrows or mounds of earth having been removed ages ago; and he therefore thought it probable such might have been the case with this undoubtedly very primitive burying-place,—possibly of the Stone period, from the character of the pottery. It transpired, during the remarks that followed on this important and most interesting find, that Mr. Franks, of the British Museum, had been since to see the cemetery, and that several of the urns that Mr. Leonard had been fortunate since to recover were to form part of the collection of stone implements and weapons, illustrating the Neo-lithic age, about to be exhibited at the Society of Antiquaries, although the date probably to be assigned to these sepulchral vases is more likely to be of the Bronze age than the Stone period.

WALTON SEWAGE AND THAMES PURIFICATION.

THE Walton sewage works are now nearly completed, and there is a desire on the part of the inhabitants of the villages and towns adjoining, and draining into the Thames, to obtain information of the means that are being adopted to comply with the Act which forbids the future pollution of the Thames.

The estimated length of the sewers in the village proper, that is, the parish of Walton-on-Thames, exclusive of that part of Hersham on the side of the railway the further removed from Walton, and the ecclesiastical district of St. Mary's, Oatlands, is, in the village, two miles, and from the village to the land to which the sewage is to be conveyed, three-quarters of a mile. The pipes which form the main conduit are purposely small, 12 in. by 9 in. and 8 in. by 6 in. They are egg-shaped, so as to require less water to keep them clean, for at Walton the water-supply is at present not at all adequate to the wants of the population. Throughout the village there are about fifty inspection-shafts, covered with cast-iron lids, laid flush with the surface of the road, and so constructed that by the insertion of a wooden paddle the sewage may be kept back until enough has accumulated to flush the sewer by its rush when suddenly liberated.

At about a mile from the village, 1¼ acre of land has been purchased by the Sewage Vestry, to which the sewage matter is to be conveyed. This is not to be considered as a sewage farm: it is simply a filter-bed, to be used intermittingly, as recommended by Dr. Frankland, after numerous experiments made by him at the Royal River Pollution Commission. This process will, in all probability, be unremunerative, but the parish has, by adopting it, complied with the Thames Conservancy Act, and has placed itself in a position to take up any scheme that may, in the future, prove a success, whether irrigation, precipitation, filtration, or any other.

The works have been carried out from the beginning by Mr. R. W. Peregrine Birch, C.E., under the direction of a sewage committee, Mr. Raffell acting as clerk of works. The pipes, which are of glazed fireclay, were manufactured by the Farnley Iron Company (near Leeds), who obtained the contract by tender. To meet the expenses of laying down the new sewer, 3,000*l.* were borrowed from the Loan Commissioners, to be repaid with interest at 5 per cent. in twenty years; but it is confidently hoped that the whole of this sum will not be required. The present old brick sewer will still be retained, but will be used solely for rain and storm water, none of which will be allowed to enter the new sewer.

THE DESIGN FOR THE LAW COURTS.

SIR,—The thanks of all art-lovers among the general public, and of the entire artistic profession, are largely due to you for the outspoken way in which you have discharged an invidious and no doubt reluctant duty, in censuring Mr. Street's Law-courts designs. Had he produced a noble and satisfying design, you would have been the first to give it hearty recognition; but as things have turned out, it becomes a matter of patriotism, at all cost, whether of personal feeling or otherwise, to save the country being committed to what, if Mr. Street's designs are carried out, will be no cause of just pride and architectural renown, such as it was a right to hope for and expect, but of humiliation at another failure such as has too often occurred before, and the loss of an opportunity which may never arise again. Mr. Street has had the *fullest* opportunity to prove himself the man for the occasion, and has failed. However unfortunate, there seems nothing for it but that he should call in additional aid. NEMO.

*** We have received more than a dozen other letters endorsing the opinions we have expressed, but do not think it necessary to print them.

ORDNANCE SURVEY MAPS AND THE BRITISH MUSEUM.

I HOPE that eventually the valuable parochial maps now being constructed in England and Wales, as well as all the town and county maps of this useful survey, will be included in the library of the British Museum; but at present, according to the red coloured catalogue there, these merely include, as to England and Wales, all the counties except the four northern English counties, which are incomplete as to eight divisions. The survey of the Isle of Man is wanting. As to Scotland, of the "outlines," 14, and of the "hills," 16 divisions, out of 120; and as to Ireland, of the "outlines," 46, and of the "hills," 10 divisions out of 205, only appear in this catalogue. The only other Ordnance map referred to in it, is that of London. I believe that all the surveys of the English and Welsh counties are now published, and included in the catalogue of Mr. Stanford, the publisher of them. CHR. COOKE.

FIRE PREVENTION, AND RIGHTS OF LIGHT.

SOME fine morning, when the newspaper placards show that a fourth of London has been burnt on the previous night, we shall find people beginning to think what is to be done to get rid of fires. There will be no end of suggesting, and probably nothing even then will be done. It is therefore, perhaps, useless for me to point out what I consider the only safe way of getting out of this fire difficulty with respect to new buildings; but still, if you like to print my notion, here it is. What is wanted is a new *Building Act*, which shall provide that everything in the erection of any building whatever shall be *fire-proof*. We should get into concrete floors and roofs, do away with wooden frames, sashes, doors, skirtings, &c.; no such thing as a quartered partition would be heard of; we should get better buildings by far, and, yes, after a little time, cheaper buildings. Certainly it would be all up with joiners, carpenters, and Fire Insurance Offices, but the first and second could go in for metal work, and the latter exclusively for life. The occupation of the fire brigade would be gone. I would also oblige carpet and curtain manufacturers to fire-proof all their work; a man would therefore have little to set fire to except his furniture and pictures, and if he liked to have a good blow up of gas, he should pay for all the damage done to neighbouring buildings.

This same *Building Act* should do away with all *rights of light*. If two people buy plots of land adjoining each other, and can build up as high as they like, I do not see why, if one man build and the other does not for twenty-five years, he shall then be prevented from doing so because his neighbour has been overlooking his land all the time. G. T.

THE DRAINAGE OF WINDSOR.

SIR,—I hear, but scarcely believe it possible, that the town of Windsor has committed the fate of its drainage to the A B C Company. Can it be true? CASTLE.

*** It certainly *is* true that the arrangement is very nearly completed: the Local Board of Health propose to give a concession to the company for twenty-five years, and to grant them three acres of land for the sewage.

FIRE CLAY.

SIR,—I have read the letters in your valuable paper with some interest, and agree with Mr. Gibson, that the silica in the fire-bricks makes them withstand the heat the best. I wish some of your scientific subscribers would state their views, and why the clay, of which the following is an analysis, containing 74 per cent. of silica, does *not* make a fire-brick or crucible, but falls or crumbles after the manufacture of it. J. NUNN.

"I have examined and now certify that the sample marked Nant-y-Gamer fire-clay, contains:—

Water of Combination	3·62
Silica	74·25
Alumina	20.60
Oxide of Iron	0·70
Lime	0·30
Magnesia	traces
Potash	0·48
	100·00

This analysis therefore indicates that the clay is of excellent quality for fire-clay purposes.

(Signed) A. NORMAN TATE."

THE PAINT AT ST. PAUL'S.

I CANNOT always praise the *Builder*: it is so very "considerate," as the term goes, and does not slash about enough for me and some of the other young men; but it does good at times. For example, the whole of the *green* paint is now cleaned off the columns in St. Paul's, and the *white* marble "restored." It seems incredible that such things can be attempted.

A STUDENT.

DECORATIONS OF ST. MARY IN THE CAPITOL, COLOGNE.

SIR,—I have read with much interest your correspondent's notes upon the new decorations being carried out at St. Mary in the Capitol, at Cologne. As I have carefully watched the progress of this remarkable work for the last five years, I take the liberty of correcting two or three inaccuracies into which your correspondent has fallen. In the first place, the subject represented in the concha of the great eastern apse is not the "Coronation of the Blessed Virgin Mary," but our Lord seated in Majesty, surrounded by the five choirs of angels. The composition of this portion of the work is singularly noble and beautiful.

In the second place, the four angels over the crossing of the church do not "represent the Deluge," but the four rivers which watered Paradise,—Pison, Gihon, Hiddekel, and Euphrates (Gen. ii.),—and the whole composition of this portion of the work is a typical picture of the "Heavenly Jerusalem," with its walls, towers, &c. "And (it) had a wall great and high, and had twelve gates, and at the gates twelve angels, and names written thereon, which are the names

of the twelve tribes of the children of Israel" (Rev. xxi.).

The figures painted upon the vaulting of the choir represent the Four Evangelists and the four greater prophets. Your correspondent must surely be in error when he represents the paintings of the choir as being now in progress, for they were the first portion of the work carried out by Mr. Kleinertz, whereas the narthex, which he describes as being completed, was only being *commenced* when I was in Cologne two months ago. I am inclined to think that his notes, which are made to refer to the narthex, really describe the paintings in the choir, and *vice versâ*.

H. W. B.

BUILDING PRICES.

Sir,—The book you recommended, giving the constants of labour, viz., Dobson and Tarn's "Students' Guide to the Practice of Measuring and Valuing," is a most excellent work, but it is unfortunately neither elementary in its character nor sufficiently comprehensive to become a standard authority. As to the particular information required by your correspondent "A. B. C.," Hurst's "Architectural Handbook" gives full particulars; but great care must be taken in using them, as the constants for mixing mortar, erecting scaffold, striking ditto, actual building works, pointing, &c., are all given separately. The time for each item must be ascertained, and the result totalled, before the value of the labour of building a wall can be ascertained.

Q. R.

PUTRID BONES.

Sir,—*Apropos* of bad smells, as fever producing agents, I send a word of caution to householders who may, like myself, permit their cook or housemaid to accumulate what is appropriately enough called "kitchen fee"—*i.e.* dripping, bones, rags, waste paper, and cheese-parings generally—in the shape of perquisites. "It is a custom," as I have found out, "more honoured in the breach than the observance," as Hamlet says of something else. Being conscious for some time of an abominable smell pervading my house, and particularly the apartments next the kitchen, I ordered one day a rigid inspection, and discovered, to my horror, a mass of nearly half a hundredweight of *putrid bones* carefully piled up on a shelf in the coal-closet. I need hardly say that I ordered a speedy dispersion of the *corpus vile*, to be followed with copious ablutions with chloride of lime. I have also since that occasion abrogated the privilege of *storage* on *my* premises—not feeling strong enough just at this moment, in point of law or equity, to put an end to the contract of kitchen fee absolutely. Others, however, may feel themselves in a better position.

A Bachelor.

SOUND AND ECHO.

GANOT'S PHYSICS.*

In the present edition of this valuable work, a somewhat larger and finer type and a larger page have been adopted than in previous editions, with additional illustrations and new matter, though with fewer of the enlarged pages than heretofore.

In recommending this excellent work to the attention of students of physics, we shall simply give a specimen of its mode of treating the subjects in hand, which in this case relate to causes that influence the intensity of sounds; to echoes and resonances; and to refraction of sounds.

Causes which influence the Intensity of Sound.—Many causes modify the force or the *intensity* of the sound. These are, the distance of the sonorous body, the amplitude of the vibrations, the density of the air at the place where the sound is produced, the direction of the currents of air, and lastly, the proximity of other sonorous bodies.

1. *The intensity of sound is inversely as the square of the distance of the sonorous body from the ear.* This law has been deduced by calculation, but it may be also demonstrated experimentally. Let us suppose several sounds of equal intensity,—for instance, bells of the same kind, struck by hammers of the same weight, falling from equal heights. If four of these bells are placed at a distance of 20 yards from the ear, and one at a distance of 10 yards, it is found that the single bell produces a sound of the same intensity as the four bells struck simultaneously. Consequently, for double the distance the intensity of the sound is only one-fourth.

The distance at which sounds can be heard depends on their intensity. The report of a volcano at St. Vincent was heard at Demerara, 300 miles off, and the firing at Waterloo was heard at Dover.

2. *The intensity of the sound increases with the amplitude of the vibrations of the sonorous body.* The connexion between the intensity of the sound and the amplitude of the vibrations is readily observed by means of vibrating cords. For if the cords are somewhat long, the oscillations are perceptible to the eye, and it is seen that the sound is feebler in proportion as the amplitude of the oscillations decreases.

3. *The intensity of sound depends on the density of the air in the place in which it is produced.* As we have already seen (199), when an alarum moved by clockwork is placed under the bell-jar of the air-pump, the sound becomes weaker in proportion as the air is rarefied. In hydrogen, which is about $\frac{1}{14}$ the density of air, sounds are much feebler, although the pressure is the same. In carbonic acid, on the contrary, whose density is 1·529, sounds are more intense. On high mountains, where the air is much rarefied, it is necessary to speak with some effort in order to be heard, and the discharge of a gun produces only a feeble sound.

The ticking of a watch is heard in water at a distance of 23 ft.; in oil, of 16½ ft.; in alcohol, of 13 ft.; and in air, of only 10 ft.

4. *The intensity of sound is modified by the motion of the atmosphere and the direction of the wind.* In calm weather sound is always better propagated than when there is wind; in the latter case, for an equal distance, sound is more intense in the direction of the wind than in the contrary direction.

5. Lastly, *sound is strengthened by the proximity of a sonorous body.* A string made to vibrate in free air and not near a sounding body has but a very feeble sound; but when it vibrates above a sounding-box, as in the case of the violin, guitar, or violoncello, its sound is much more intense. This arises from the fact that the box and the air which it contains vibrate in unison with the string. Hence the use of sounding-boxes in stringed instruments.

Echoes and Resonances.—An *echo* is the repetition of a sound in the air, caused by its reflection from some obstacle.

A very sharp, quick sound can produce an echo when the reflecting surface is 55 ft. distant; but for articulate sounds, at least double that distance is necessary; for it may be easily shown that no one can pronounce or hear distinctly more than five syllables in a second. Now, as the velocity of sound at ordinary temperatures may be taken at 1,125 ft. in a second, in a fifth of that time sound would travel 225 ft. If the reflecting surface is 112·5 ft. distant in going and returning, sound would travel through 225 ft. The time which elapses between the articulated and the reflected sound would, therefore, be a fifth of a second, the two sounds would not interfere, and the reflected sound would be distinctly heard. A person speaking with a loud voice in front of a reflector, at a distance of 112·5 ft., can only distinguish the last reflected syllable: such an echo is said to be *monosyllabic*. If the reflector were at a distance of two or three times 112·5 ft., the echo would be *dissyllabic*, *trisyllabic*, and so on.

When the distance of the reflecting surface is less than 112·5 ft., the direct and the reflected sound are confounded. They cannot be heard separately, but the sound is strengthened. This is what is called *resonance*, and is often observed in large rooms. Bare walls are very resonant; but tapestry and hangings, which are bad reflectors, deaden the sound.

Multiple echoes are those which repeat the same sound several times: this is the case when two opposite surfaces (for example, two parallel walls) successively reflect sound. There are echoes which repeat the same sound twenty or thirty times. An echo in the château of Simonetta, in Italy, repeats a sound thirty times. At Woodstock there is one which repeats from seventeen to twenty syllables.

As the laws of the reflection of sound are the same as those of light and heat, curved surfaces produce *acoustic foci*, like the luminous and calorific foci produced by concave reflectors. If a person standing under the arch of a bridge speaks with his face turned towards one of the piers, the sound is reproduced near the other pier with such distinctness that a conversation can be kept up in a low tone, which is not heard by any one standing in the intermediate spaces.

There is a square room with an elliptical ceiling, on the ground floor of the Conservatoire des Arts et Métiers, in Paris, which presents this phenomenon in a remarkable degree when persons stand in the two foci of the ellipse.

It is not merely by solid surfaces,—such as walls, rocks, &c.,—that sound is reflected. It is also reflected by clouds, and on passing into a layer of air of greater density than its own; it is also further reflected by the vesicles of mist. When the weather is foggy, sounds undergo innumerable partial reflections, and are rapidly destroyed.

Whispering-galleries are formed of smooth walls having a continuous curved form. The mouth of the speaker is presented at one point, and the ear of the hearer at another and distant point. In this case, the sound is successively reflected from one point to the other until it reaches the ear.

Different parts of the earth's surface are unequally heated by the sun, owing to the shadows of trees, evaporation of water, and other causes, so that in the atmosphere there are numerous ascending and descending currents of air of different density. Whenever a sonorous wave passes from a medium of one density into another it undergoes partial reflection, which, though not strong enough to form an echo, distinctly weakens the direct sound. This is doubtless the reason, as Humboldt remarks, why sound travels further at night than at daytime; even in the South American forests, where the animals, which are silent by day, fill the atmosphere in the night with thousands of confused sounds.

Refraction of Sound.—It will be shown in the sequel that *refraction* is the change of direction which light and heat experience on passing from one medium to another. Sondhauss has found that sonorous waves are refracted like light and heat. He constructed gas lenses, by filling spherical or lenticular collodion envelopes with carbonic acid. With envelopes of paper or of goldbeater's skin the refraction of sound is not perceptible.

Sondhauss cut equal segments out of a large collodion balloon, and fastened them on the two sides of a sheet-iron ring 1 ft. in diameter, so as to form a hollow biconvex lens about 4 in. thick in the centre. This is filled with carbonic acid, and a watch was placed in the direction of the axis: the point was then sought, on the other side of the lens, at which the sound was most distinctly heard. It was found that when the ear was removed from the axis, the sound was scarcely perceptible; but that at a certain point on the axial line it was very distinctly heard. Consequently, the sonorous waves in passing from the lens had converged towards the axis, their direction had been changed; in other words, they had been refracted.

The refraction of sound may be easily demonstrated by means of one of the very thin india-rubber balloons used as children's toys, inflated by carbonic acid. If the balloon be filled with hydrogen, no focus is detected: it acts like a convex lens, and the divergence of the rays is increased, instead of their being converged to the ear.

* "Elementary Treatise on Physics, Experimental and Applied, for the Use of Schools." Translated and edited from Ganot's "Éléments de Physique" (with the Author's sanction). By E. Atkinson, Ph.D., F.C.S., Professor of Experimental Science, Staff College, Sandhurst. Fifth Edition, revised and enlarged. Illustrated by a coloured plate and 726 engravings. London: Longman, Green, & Co., 1872.

COMPENSATION FOR DAMAGE DONE UNDER IMPROVEMENT ACTS.

In the Court of Error in the Exchequer Chamber, on November 28th (sittings in Error, from the Queen's Bench, before the Lord Chief Baron, Mr. Justice Willes, Mr. Justice Keating, Baron Channell, Baron Pigott, and Baron Cleasby), the case of Flight *v.* the Vestry of St. Luke's, Chelsea, was decided.

The case raised an important question as to whether the owners of houses or premises injuriously affected by alterations made by local authorities under their Improvement Acts are entitled to any compensation. The case had arisen thus:—Mr. Flight is the owner of a house in the parish of St. Luke, Chelsea, the pavement opposite to which was raised between 2 ft. and 3 ft., so as most seriously to injure the house. He claimed compensation, but it was refused, the Vestry declaring that they acted under the Chelsea Improvement Act and the Local Government Acts, which incorporated the Lands Clauses Act, but contained no express provisions for compensation. Thereupon the owner claimed 300*l.* as compensation, and proceeded under the Lands Clauses Act to appoint an arbitrator on his behalf. The Vestry, however, declined to appoint an arbitrator on their part, and the arbitrator appointed on behalf of the owner proceeded *ex parte* and made his award. The Vestry refused to recognise it, and Mr. Flight thereupon applied to the Court of Queen's Bench for a *mandamus* to compel

them to take up the award. That Court decided in his favour. Thereupon the Vestry brought error. The enactment on which they chiefly relied was the 104th section of the Improvement Act. The enactment on which the claimant chiefly relied was sec. 83. And the Lands Clauses Act, it was urged, contains ample provisions for compensation for premises "injuriously affected."

After a discussion amongst the judges, the Lord Chief Baron, in delivering judgment, said the enactment which authorised the pavement to be altered was "subject to the other provisions of the Act," one of which (sec. 83) expressly incorporated the enactments of the Lands Clauses Act, which contained provisions as to compensation. It had been urged, indeed, that there was no express provision for compensation to persons whose premises were "injuriously affected;" but the 22nd and 23rd sections of the Lands Clauses Act clearly and expressly conferred the right to compensation in such cases. Those sections expressly applied in cases where premises were "injuriously affected" by the execution of the works, and if the compensation claimed or offered "in any such case" amounted to more than 50*l.*, then proceedings by arbitration were provided. All this was expressly incorporated in the Local Improvement Act, and applied to any "improvements" effected under that Act. A liberal construction must be put upon such enactments; and, unless the claim to compensation was clearly excluded, they ought to be held to give compensation to persons the value of whose property was seriously injured by the works and operations of public bodies. It had not been shown that the right to compensation was excluded in such a case as the present. It might be that in cases of slight and inconsiderable injuries, such as were contemplated in some of the provisions he had referred to, compensation was excluded; but it was otherwise in cases of serious injury, such as the present, in which the pavement might be raised so high as to block up the man's house altogether. It was impossible to imagine that the Legislature intended that in such cases there was to be no compensation to the party injured. It had been argued, indeed, that the improvements to be the subject of compensation were only such as involved the taking of land; but there was no reason why the enactment should receive so limited a construction. On the whole, therefore, he was of opinion that the judgment for the claimant was right.

Mr. Justice Willes said he entirely concurred in this judgment, and the other learned judges concurred, so that the judgment of the Court of Queen's Bench was affirmed.

SEWERS OF DEPOSIT.

SIR,—It would be interesting to know where the ancient sewers referred to in the following extract from "J. P.'s" letter in your recent issue are to be found:—

"Scores of miles of sewers of the above description, which were put down during the reigns of Charles II., James II., William and Mary, Anne, and Georges I. and II., are still in existence."

I presume "J. P." is the author of the ingenious section in your Number of the 14th of October, 1871, p. 809, in which the arch of the invert bottom is cut through its entire thickness, endangering the stability of the sewer. If such a work as reconstructing the bottom of a sewer is necessary, an egg-shaped inverted arch should replace the old invert for the full width, so that the sides of the sewer may be properly secured.

But if there are so many miles of these flat-bottomed sewers,—some with little fall, some with none, and some with the fall the wrong way,—it is not quite clear how his extra 10½ in. in section is to improve them. For example, take a sewer 100 yards in length, with no fall, and falling into another in a similar condition, what good could result from lowering the bottom 10½ in. all over its length, for the section does not appear to admit of any variation in depth? In short, such works would be a waste of money, except in isolated cases, where the outfalls could be readily lowered.

"J. P." has rather magnified this subject. I know the London sewers pretty well, and I also know there are certain sewers as described, but not such a vast number of them as he tries to make out, and in almost every instance they are not more than 8 ft. below the road to the invert. Now, I ask, what is the use of adding 10½ in. to sewers so shallow that they do not admit of good house drainage, especially where there are basements? In all such cases the sewers should be destroyed, and new ones constructed, at a depth of not less than 12 ft. below the roads at the highest point. Any other way of treating them would be a useless expenditure of time and money.

A LONDON SURVEYOR.

MEMORIALS.

The Poet Cowper.—It is proposed to erect a memorial of William Cowper, the poet, in the church of his birthplace, Great Berkhamstead, Hertfordshire, of which his father was rector. It is proposed that the memorial shall be an east window, immediately over the grave of the poet's father and mother, in the recently-restored parish church. Those who are inclined to help are requested to communicate either to the rector, Great Berkhamsted, or with Mr. William Longman, Paternoster-row, London.

Villiers Memorial, Welford.—Lady Elizabeth Villiers is to rebuild the north aisle of Welford church, in memory of the late Hon. F. W. C. Villiers. Several of the friends of Mr. Villiers having expressed a wish to join with the parish in the restoration of the church in memory of him, their co-operation is accepted; but no steps already taken are considered as pledging the parish to proceed further until a sufficient sum is secured to cover the estimated cost of a new roof for the nave.

Proposed Memorial of Dr. Jenner.—An effort is being made to fill the east window of Berkeley Church with stained glass, as a memorial of Dr. Jenner. An influential committee has been formed, consisting of Earl Bathurst, Earl Ducie, Lord Fitzhardinge, Col. Kingscote, C.B., M.P., Mr. Barwick Baker, Mr. Gambier Parry, and Mr. H. J. Scobell (Pershore), Mr. Henry Kingscote, of 96, Eaton-place, London, is the hon. secretary.

FIREPROOF FIRE ESCAPES.

SIR,—I have observed several letters in the daily papers since the lamentable accident by which the fireman Ford lost his life, asking for a reconsideration of the material with which the fire-escapes are constructed.

It appears that whenever the flames come in contact with the canvass it takes fire, and the escape is rendered useless for its purpose, and a source of danger to the brave fellows in charge. I have to suggest to the authorities, through your columns, that asbestos should be used instead of the canvass and geuse. The mineral is of a fibrous texture, and its name, signifying that which is inconsumable, describes its distinguishing property. The ancients, it will be remembered, made it, particularly a silky variety of it, called Amiosthus—into an incombustible kind of cloth, in which they burned the bodies of their dead, in order that they might collect the ashes without mixture. Let the moderns use it to save from burning the bodies of the living!

Pliny tells us that he had seen napkins and towels of Amianthus taken from the table of a great feast, and burned before the company, by which operation they became better cleansed than if they had been washed.

There may be some practical objection to this material of which I am ignorant [want of sufficient strength; and its cost]; but I pen this suggestion as one interested, as all are, in perfecting the means by which any may be rescued from a fearful death, and the lives of those preserved from unnecessary danger who so continually and nobly risk them.

E. J. L.

PATENTS, SEWERAGE, AND WATER SUPPLY.

FROM an address by Mr. R. W. Thomson, C.E., President of the Royal Scottish Society of Arts, we take the following:—

It appears to me that greater changes are impending over the world during the next fifty years than have ever taken place in the centuries that have passed. These great changes may not be due to the discovery of new powers in nature. We may not invent anything corresponding to the telegraph, or the railway, or the steamship; but what we shall do is to apply these inventions to an extent which will completely metamorphose the whole globe.

Speaking of the Patent Laws, Mr. Thompson suggested the erection of a patent tribunal, composed of scientific men, whose duty it would be to examine all applications for patents. On this tribunal would be thrown the task of ascertaining whether the invention for which a patent was applied had been anticipated by any previous patentee, or whether it was in use already without being patented. As soon as the petition for a patent was lodged, along with a description of the invention, this inquiry would be made, and the result communicated to the applicant for a patent. He would then leave the entire responsibility of taking any further steps to the applicant. By this means there was no doubt whatever that an immense number of patents would never go beyond this first stage. It would not, he thought, be a safe or wise proceeding to intrust the power of refusing patents to any tribunal whatever.

The next topic touched upon was the disposal of the sewage of large towns, regarding which he said that a careful consideration of the subject in all its bearings had led him to the firm conviction that large towns would ultimately be compelled to separate entirely their system of sewage from their ordinary drainage. The difficulty of carrying out this separation was far less than at first appears. The separation of sewage from drainage would involve some re-arrangements in the pipes within the houses, as well as a separate set of channels under the streets. The cost of such channels under the streets would be comparatively small, as the matter flowing through them would be almost constant in quantity, whereas the drains, having to provide for rain-storms, must be of enormous capacity. His proposal, and the system he would suggest, would simply consist in devoting the existing sewers under the streets to the purpose of drainage, while he would lay down cast-iron pipes for the purpose of conveying sewage matter into proper receptacles, which would be entirely closed so as to prevent the escape of all deleterious gases, such as takes place when sewage matter is thrown into the great sewers.

Closely connected, he proceeded, with the suggestion which I have just mentioned regarding the separation of sewage from drainage is another suggestion which I venture to make, namely, the separation of our water supply into two qualities. The constant tendency of the increasing population to gather together in large towns, combined with the continually-increasing consumption of water for each inhabitant of these towns; an increase, it must be borne in mind, not of water to drink or to use in any form of cooking, but an increase in the use of water for watering the streets, for bathing, and general sanitary purposes, renders it necessary to provide such an enormous quantity of water that it has become practically impossible in many large towns to procure the requisite quantity of water without lowering the standard of the quality. Water of sufficient purity for washing clothes, bathing, watering the streets, manufacturing purposes, waterclosets, and a number of other purposes, could be procured in almost all localities with very little trouble and at very little cost; but when our municipal authorities set to work to water the streets and to flush the sewers with water of the same quality as we require for drinking, then the task indeed becomes a very difficult one, and the attempt to carry it out an absurd waste of money and energy.

CHURCH-BUILDING NEWS.

Tyler's Hill, Bucks.—The new church and schools at Tyler's Hill, near Chesham, have been opened by the Bishop of Oxford. The new building, which is to act in the double capacity of church and schoolroom, was designed by Mr. M. Glover, the son of the eminent composer, Mr. Stephen Glover, whose songs and ballads are well known. It was built by Mr. Spicer, of Wycombe, very satisfactorily. The style of architecture adopted is that of the Early French Mediæval, with an apsidal, or rounded chancel, a very small vestry on the north side, and a porch on the south. The roof is open and slightly stained, and the whole building, both within and without, being composed of coloured brick,—red, grey, yellow, and black,—a contrast of tints is maintained throughout; and the due lighting of the chancel was provided for by a *corona* bearing wax candles, suspended from the chancel arch. The nave is lighted by bracket oil lamps at intervals all down the church. The land and a considerable portion of the materials were given by Lord Chesham, while all the interior fittings were the gifts of persons who for the most part desired that their names should be kept secret. The font was the gift of Mr. G. G. Hill, the bell was presented by Mrs. Folkhard, and the communion-service by Miss Dora Stratton.

Walworth.—The new church of All Souls', Grosvenor Park, Walworth, has been consecrated by the Bishop of London. The building of this church has resulted from the efforts of the London Diocesan Home Mission in connexion with the Bishop of London's Fund. The site was given by Mr. Philip Urlwin, of Loughborough Park, Brixton, and the Misses Billiter. The amount contributed by Mr. Urlwin is between 3,000*l.* and 4,000*l.* The total cost of the church, with organ and furniture complete, is over 9,000*l.*

York.—The church of St. Saviour, in this city, which has recently undergone extensive internal repairs, has been re-opened by the Archbishop. The lofty roofs, which were stained very darkly, have been painted a light buff, ornamented with blue, crimson, and gold. All the pews have been re-stained and varnished, and also the front of the west gallery. This portion of the work has been executed by Mr. Webster, painter. The old reredos was a large wooden one, which has been removed, thereby opening out the lower mullions of the east window. A new reredos, the work of Mr. T. Gibson Hartley, decorator, has been substituted for the former one, the lower interstices of the window being filled with illuminated panels bearing evangelical emblems, the "Alpha" and "Omega," the cross and the crown. A corona of brass has been suspended in the chancel, and the nave lighted with brass standards. The piers and arches of the arcades have been stripped of whitewash, the stonework re-dressed, and in some places restored by Mr. Mennell. The organ-case has also been decorated, the lower portions of the walls of the church painted, and several other lesser improvements effected. The total cost of the restoration has been about 300*l.*

Northleach.—The restored chancel of Notgrove Church has been re-opened. The restoration has brought to light traces of former features, and these remains have been preserved for the information of the antiquary and architect. The chancel (like some others in this part of the county) was originally built without any

east window. The careful stripping of the walls has solved the question of how such a blank east wall was originally treated. Canopied niches, which had contained sculptured historical groups, formed the principal features of the design, and that was completed by a system of paintings containing Scriptural subjects, the decorative painting being continued on the side walls and throughout the chancel. In restoring the chancel, the south wall, which was much shaken and out of perpendicular, has been rebuilt; the windows have been renewed; a new chancel arch has been inserted, and the gables over it have been rebuilt, retaining the old sanctus bell-cot: a new roof has been put on, of similar design to the old one; the floor of the chancel has been re-paved with stone and encaustic tile borders, and the sacrarium with Godwin's encaustic tiles, made in imitation of old patterns. The stalls and reading-desk are of deal, slightly stained and varnished; the lectern is of oak. The windows (of which there are only two, and these on the south side) are filled with stained glass by Messrs. Clayton & Bell. The three-light easternmost window has figures of St. Matthew, St. Bartholomew (the patron saint), and St. Mark; and the other, a two-light window, the figures of St. Luke and St. John. The chancel is lighted at night by means of a simple corona for eight lights, of brass and painted iron, hung from the collar of the roof. In consequence of the discovery of the ancient paintings, &c., and the want of funds to restore them at once, it has been necessary to put hangings at the east end to make it fit for service.

Kenton (*Suffolk*).—The church of this small village has been re-opened after restoration. Owing to the neglect of bygone years the whole building had got into a very unsatisfactory condition, and Mr. Hakewill, of Bealings, having prepared plans, the tender of Mr. Cornish, North Walsham, was accepted; and in the course of the last five months the old roof of the nave, which was covered with lead, and was plastered inside, has been removed, and a new open oak roof covered with tiles has been substituted; the chancel has been re-roofed, the new roof being arch-shaped and boarded, the ribs being ornamented at their junctions with carved bosses; new windows have been put in the three chancel walls; the windows of the nave reglazed with cathedral glass, and the whole church benched, besides various minor improvements. The external walls (of flint) are to be re-pointed. The amount of Mr. Cornish's contract was 800*l*.

Warminster.—The new chancel erected at the east end of Christ Church, Warminster, has been re-opened. The new chancel is in the Perpendicular style, and was erected from a design by Mr. T. H. Wyatt, the diocesan architect.

Kenley (*Coulsdon*).—A new church has been opened at Kenley. The edifice will seat 300 persons. The estimated cost, including tower and spire now building on north side of chancel, organ, bell, &c., yet to be obtained, is about 3,500*l*. The church was the design of Mr. J. Fowler, of Louth, whose plans were recommended by Mr. G. G. Scott, whose advice was asked concerning the designs sent in. It consists of nave with three bays, north and south aisles, north arch, chancels, with organ-chamber on north side; the chancel terminates with a gabled apse. The style is Early Geometrical, and the material used externally is Kentish rag, the interior of wrought brickwork, interspersed with stone. The pillars are round, of stone, and have carved capitals. The seats are of pine. The nave is lighted with gas jets round the capitals of the pillars, the chancel having standards. The pulpit on the north side is of stone, with brass desk. The floors are paved with Minton's tiles. The east window is of three lights, and at its base are five arches, the central one surmounted by a cross. The west window is of four lights. Those in the aisle (which are lean-to) are short in appearance.

Yapton.—The parish church has been re-opened after restoration. The ceiling, archways, and pillars, have been cleansed so as to show the original stonework. A new west window has been put in. The old pews have been removed, and new seats have been placed throughout the nave and side aisles. There is also a new pulpit and reading-desk, of wood. The chancel, which contains several monumental tablets, has not been touched at present. The restoration has been executed by local tradesmen.

Bradford.—The foundation-stone of a new church, for the congregation of St. John's, has been laid by the Bishop of Ripon. The site is in Little Horton-lane. The new edifice will accommodate over 700 persons, and will cost about 7,000*l*. The plan consists of nave, with north and south aisles, south transept, chancel, organ-chamber, and vestries for choir and clergy. The extreme length of the church within the walls is 125 ft.; the width of the nave and aisles, 50 ft.; and the height of nave-ridge, 50 ft. above the floor. The style is Decorated. The principal entrances are at the west end of the north and south aisles, the porch on the north side towards Horton-lane being the more elaborate of the two, having a deeply recessed outer doorway, with niche for statue of the patron saint (St. John), and an arcade pierced with windows on the side. Precaution has been taken by means of double doors to exclude draughts. The principal feature of the church externally will be the central tower, 23 ft. square, and rising to a height of 109 ft. above the ground. It is carried on four piers, with arches opening into the nave, chancel, organ-chamber, and transept. Large belfry windows occupy the sides above the roof, and lofty pinnacles rise from the angles. The rapid fall of the ground causes the chancel outside to be unusually lofty. The east window is of five lights, with moulded tracery in the head. The aisles are lighted by coupled two-light windows, with quatrefoil openings above them, and the clearstories contain circular windows, two in each bay, alternating in design. The west end of the nave is pierced by two coupled lancet-windows, surmounted by a large rose-window, consisting of a foliated ring, from which radiate twelve columns supporting trefoil heads. The church internally will be lined with pressed brick, relieved with bands of black brick and ashlar stone. The roofs, except those of the aisles, which are constructed of bindings and purlins, are coupled rafters, those of the nave and chancel being covered on the under side with arched boarding. The seats are of pitch pine, and the stalls and other fittings of the chancel, together with the doors, are of wainscot oak. The warming is proposed to be effected by means of Haden's hot-air apparatus. The contractors are:—For masons' and joiners' work, Messrs. Beanland; plumbers and glaziers' work, Mr. John Schofield; slating, Mr. T. Nelson; and painting, Mr. James Greenhough. The architects are Messrs. T. H. & F. Healey.

Bromsgrove.—At a meeting of the committee for carrying out the proposed new church in Bromsgrove, plans for the church were exhibited by the architect, Mr. J. Cotton, which, after some discussion, were approved. The ground-plan provides accommodation for 600 people, exclusive of the choir-benches in the chancel. The church will comprise nave and side aisles, tower at north-west corner, porch on south side, chancel, with apsidal termination and organ-chamber, and vestries for clergy and choristers. A basement will be sunk for the heating apparatus. The easternmost bay of aisles is slightly projected and gabled in the transeptal form. The style is Early Decorated. A tower, with spire, rises at the north-west corner, its altitude being about 175 ft., the upper part of the tower containing the belfry, with ornamented double lancet lights and louvres for the passage of sound; but it is not contemplated to execute the upper portion of the tower and spire at present, owing to the limited funds. The church is intended to be built with the local sandstone, the walls lined inside with buff-coloured bricks, relieved with stone strings and bandings; dressings, arches, window-tracings, &c., in Bath and part in local grey sandstone. The church will be built upon a site adjoining the Birmingham-road, and the work will be commenced early in the ensuing spring.

Bishopsbourne.—It is proposed to undertake a thorough repair and restoration of the ancient and picturesque church of Bishopsbourne—the church and burial-place of Richard Hooker—under the advice and superintendence of Mr. Gilbert Scott, who has lately made a preliminary survey of the building, and presented a report on its present condition and the works which he thinks it desirable to have executed. To complete all the works recommended by Mr. Scott would, it is estimated, involve an outlay of 1,900*l*. or 2,000*l*.

Nutley.—The church has been opened for divine worship, having been enlarged by the addition of a north aisle and vestry. Besides the enlargement of the church, the chancel has been beautified by the additional gifts of Mr. and Mrs. Merry. A parsonage has been built. The church work has been done by Mr. G. Cheesman, builder, under the superintendence of Mr. W. Shaw, architect.

Horsham.—St. Saviour's Church, Colgate, more than two-thirds of which is new, has been completed with enclosed burial-ground, at the expense of Mr. James Clifton Brown, of Holmbush, on the Holmbush estate, at Colgate. The building and ground has been consecrated by the bishop of the diocese. At the communion or east end is a stained-glass window.

Orpington.—It has been resolved to restore and refit the nave of the church here, and a committee has been appointed to carry out the intention.

Farningham.—The church, after restoration and consecration of additional burying-ground by the Bishop of Dover, has been re-opened. The galleries at either end of the nave have been removed, so as to display the architecture of the chancel arch and the tower opening; the high pews and higher pulpit have been replaced with open seats facing uniformly to the east, the font being placed near the north door. The roof of the nave remains ceiled, probably because its extreme age, exceeding in some parts 500 years, made dangerous any alteration. That of the chancel has been entirely renewed, and displays an interlacing of oak beams, below planks of the same. The south side of the church, which was formerly inefficiently lighted (at the west end especially by mere square apertures in the wall), is now lighted at equal intervals by three windows of two lights apiece, the tracery of the most eastern being Decorated, and that of the other two Perpendicular. The painting formerly visible above the chancel arch, which represented Moses and Aaron guarding the decalogue, has been removed. The walls of the church are now uniformly of a buff tint. The pavement of the aisle and chancel is of red and black tiles. In the chancel an arch has been opened in the south wall, next the nave, for the reception of the organ, behind which is the old vestry. The architect employed was Mr. Ewan Christian. The work of renovating the chancel, at the cost of the Ecclesiastical Commissioners, we understand, was executed by Mr. Handcock, of Dover. The whole of the remainder of the builder's operations were done by Mr. W. Gumbrell, of Dartford. The gas-fitting was executed by Messrs. Dray & Co., of Farningham and London. A Gurney's stove was supplied by Messrs. Weekes & Tufnail, of Dartford. The stone-work was done by Mr. Middleton, of Gravesend. We believe the expenses of repair will amount to between 1,500*l*. and 2,000*l*.

Rochdale.—St. John's Church, Facit, Rochdale, has been consecrated. It is at present only a portion of the original and complete design. The part now built and consecrated comprises:—A chancel, 28 ft. by 19 ft., with north and south chancel aisles, used as vestry and organ-chamber; a nave, 72 ft. by 38 ft.; a western porch, 25 ft. by 6 ft.; baptistery, 14 ft. by 8 ft.; and a south-west porch, which is in fact the basement of the future steeple, now only carried up high enough to take the stairs which give access to the western gallery. The complete design comprises short aisles to the nave of two bays each, marked off by arches and central pillars of stone. These will give 156 additional sittings. The present accommodation is for 467 adults; and of course ultimately for 623, but the church is so planned that, without overcrowding, 540 grown-up persons may even now be seated on special occasions, and when the church is quite finished, in the same way, about 700 may find seats. The church stands on the summit of a little hill by the roadside, and close to the village of Facit. The style is Early Decorated, the tracery and all other such ornamental features being all of geometric forms. The cost, including between 300*l*. and 400*l*. for foundations, was 3,500*l*. The contractor for the work was Mr. W. Storrs; the foundations being put in by Messrs. Longworth & Co. The architects are Messrs. Medland & Henry Taylor, of Manchester.

Manchester.—St. James's Church, George-street, Manchester, is one of the old-fashioned city churches, built about the end of the last century, with high boxes for pews, three-decker pulpit in the centre of the nave, and no chancel, but only a very shallow sacrarium. Designs have recently been made by Messrs. Medland & Henry Taylor, of Manchester, architects, for the recasting of this church. During the last few months a portion of the design, viz., the forma-

tion of a "chorus cantorum," or quasi-chancel, has been proceeded with. This consists of a tiled platform, raised three steps above the nave floor, on the north and south sides of which are ranged the choir stalls. It is inclosed by a low parclose or screen, surmounted by light iron-work. There is another step at the altar-rail, and a foot-pace for the Lord's table. A chorister's vestry has been formed at the north-east corner of the nave, divided off from the church by a suitable wooden screen. The organ has been brought down from the western gallery to the south-east corner of the nave, and the font has been moved to the west end of the central passage. The complete scheme includes a wrought-iron archway, with a lofty cross above, and also metal gates at the western entrance of the "chorus cantorum." This, as there is no chancel arch, serves to mark it off from the body of the church. The position of the "chorus cantorum" is further emphasised by a panelled ceiling above. There will be a reredos of appropriate design, and the whole of the eastern wall, by slight alterations, will be brought into harmony with the rest of the new work. The windows in the east wall are intended to be filled with stained glass. An arch is to be thrown across the present shallow recess. The central part of the western façade will be recased externally with brickwork, and by this and other slight alterations it is intended that a fairly church-like appearance will be given to the whole front. There is also to be a simple ironwork gable and arch over the west gateway. The cost of this quasi-chancel, with its stalls, tiling, altar-rail, lectern, new pulpit, new choir, vestry, &c., is 262*l*. The woodwork is pitch pine and mahogany. The wood of the old pulpit is re-used as far as possible. The contractor for the work is Mr. T. Darnbrough, of Rusholme.

Colchester.—St. James's Church, after restoration, has been re-opened for divine worship. The edifice was suddenly closed, having been declared unsafe by architects who were called in to report upon the state of the roof and north wall. The rector (the Rev. R. S. Cummins) with the churchwardens and a few leading parishioners, have pursued the undertaking with some boldness, but up to the present time only about 3,000*l*. have been raised out of the 4,000*l*. expenditure. The outer walls have undergone restoration, a new roof has been erected, and the church benched in place of the old pews. The organ is now placed in the north transept. The monumental windows and tombs have, of course, been respected. The church will seat 800 persons.

Horbury. — The House of Mercy Chapel, Horbury, the corner-stone of which was laid by Earl Beauchamp in August of last year, has been opened. The committee have found it imperative to add thereto one of the wings, planned at the outset of the building, but allowed to stand over till funds should be forthcoming to enable them to make another start. This last instalment comprises superior's room, common room, refectory, and chapel. The chapel is in the Early English style, 64 ft. by 22 ft., and 47 ft. to the apex of the roof. It is built of red brick, with stone facings on the outside, and within of red and blue bricks, Bath stone, Mansfield stone, and slate bands, with shafts of Aberdeen granite to the arcade and apse. There is a circular apse at the east end, with altar reached by five steps, sedilia, credence, and reredos. The apse is lighted by nine lancet windows, the three central ones being filled with stained glass, by Hardman, of Birmingham. There are six lights on each side of the nave, with arcade of granite shafts; and at the west end is a wheel window, filled with stained glass, by Mr. Kemp, of London. Here also is an oak screen forming an ante-chapel on the ground-floor, and a gallery approached from the outside, for strangers above. On the south side is the organ-loft, with vestry below. The roof is open-timbered, with deal and oak bases. At the sides of the nave are oak stall-fittings, with crocketed finials, whilst the aisles will be filled with chairs. The floor is laid with encaustic tiles; and the heating apparatus is by Mr. Nelson, of Wakefield. The architect is Mr. H. Woodyear, of Grafton, Surrey; and the contractors are Messrs. Speight & Fawcett, of Wakefield. The work has been carried out under the supervision of Mr. Walker, clerk of the works; Mr. Dean, foreman of buildings; and Mr. Maynard, of general fittings.

Kirbymoorside.—The Rev. E. M. Birch, M.A., the vicar, has already had promises to the amount of 1,800*l*. towards the church restoration fund. Mr. Gilbert Scott, architect, has inspected it for the purpose of preparing new plans.

Kilburn.—St. John's Church has been consecrated by the Bishop of London. It has been erected at a cost of about 7,000*l*., and affords accommodation for nearly 1,000 persons. It consists of nave, north and south aisles, a well-developed chancel, with apsidal termination, and two chancel aisles, one forming the vestry, and the other the organ-chamber. The style of the church is Early Decorated. The walls are faced both externally and internally with brick; in the latter case, patterns of red being freely introduced. There is a turret at the south-west corner upwards of 100 ft. high. The pulpit is of stone, with Mansfield shafts. The lighting consists of circular coronæ, hung from the nave arches and chancel. Including the site, about 9,000*l*. have been expended on the edifice. The architects of the church are Messrs. Francis; and the builders were Messrs. Dove, of Islington.

Bywell-on-Tyne.—St. Andrew's Church has been re-opened, after enlargement and restoration. It is of twelfth-century date, and is cruciform in plan; the tower, which is at the west end, being of the Early Saxon period. The new works comprise a new north transept, built on the foundations of a former one, which were discovered during the progress of the works; also a new chancel aisle, opening into the chancel on the north side by two arches. The other works comprise a reredos, a stone pulpit, and chancel seats. The architects were Messrs. Slater & Carpenter; and the contractors, Messrs. Arkle & Furguson.

Books Received.

The Art of Garnishing Churches at Christmas and other Festivals. By EDWARD YOUNG COX. Third Edition. 28, Southampton-street, Strand.

THE illustrations in this edition of "The Art of Garnishing Churches" are nearly all new, and are mostly printed by photolithography. It is a considerable improvement on the first edition, and will be found very useful just now by those who desire to make their churches participate in the gaieties of the coming season.

Introductory Notes on Lying-in Institutions: together with a Proposal for Organising an Institution for Training Midwives and Midwifery Nurses. By FLORENCE NIGHTINGALE. London: Longmans, Green, & Co.

IN a quaint little dedication, Miss Nightingale, "without permission," dedicates these valuable notes to the shade of the mother of Socrates, whose illustrious son himself said, "The midwives are respectable women, and have a character to lose." Miss Nightingale hopes to be inspired with his "spirit of questioning aright," and that those who read may learn, not of her, but of themselves.

The author gives an account of the experimental trial, at King's College Hospital, of a training establishment for nurses in such cases, and the causes of its being closed. Since that event it has been an anxious subject of inquiry with Miss Nightingale, whether it would be justifiable to reopen a nursing-school under other conditions. The volume is illustrated by plans of several forms of wards and institutions, including the late midwifery wards at King's College Hospital.

A National Technical University for Great Britain and her Colonies; or, How to Utilise Greenwich Hospital and the Obsolete Charities. London: Kelly & Co., Great Queen-street.

THE suggestions contained in this volume assume the form of a letter to Mr. Gladstone, including a report by Dr. John Mill, the secretary of the executive committee of the proposed National University for Technical and Industrial Training, which forms the main portion of the volume. In proposing the conversion of Greenwich Hospital into a National Technical University, it is intended that a portion of it should constitute a Naval University, or department devoted to students destined for the royal and mercantile marine, and the revenues of the hospital applied to that department. The report points out that there are large funds in existence which might with propriety be appropriated to the founding of a new university, without interfering with the vested interests of corporations or the alienation of charities for local purposes.

VARIORUM.

WE mention the receipt of several books to which attention will be given in due course:—"A History of the Gothic Revival: an Attempt to Show how the Taste for Mediæval Architecture, which lingered in England during the Two Last Centuries has since been Encouraged and Developed. By Charles L. Eastlake, Architect. London: Longmans, Green, & Co."; "The Choice of a Dwelling: a Practical Handbook of Useful Information on all Points connected with Hiring, Buying, or Building a House, with its Stables and Garden Outbuildings. By Gervase Wheeler, Architect. With plans and views. London: Murray, Albemarle-street"; "Stones of the Temple: or, Lessons from the Fabric and Furniture of the Church. By Walter Field, M.A., F.S.A. Rivingtons, London, Oxford, and Cambridge" (a pretty, interesting, but over-fanciful book); "Experimental Mechanics: a Course of Lectures delivered at the Royal College of Science for Ireland. By Robert Stawell Ball, A.M. With illustrations. London and New York: Macmillan & Co."; and "Queen Charlotte Islands: a Narrative of Discovery and Adventure in the North Pacific, by Francis Poole, C.E. Edited by John W. Lyndon. London: Hurst & Blackett, Great Marlborough-street."——"Patent Law and Practice: showing the Mode of obtaining and opposing Grants, Disclaimers, Confirmations, and Extensions of Patents. With a chapter on Patent Agents. By a Practitioner. London: Trübner & Co., Paternoster-row." This is a handy little manual, intended mainly to impress the necessity of prudence on the novitiate in patent matters. ——The current number of the *Art-Journal* says,—"The Commissioners of the French Department have sent in their report to the Minister of Commerce in Paris. It states that the actual sales effected by them amounted to more than 20,000*l*.; and that 'orders' had been received which would realise double that sum. For works of art upwards of 5,000*l*. had been paid. One can scarcely wonder—seeing the peculiar privileges enjoyed by French manufacturers and tradesmen, which have brought them such satisfactory results—that our countrymen have taken alarm, and are organising measures for their own future interests."——*The Garden*, a weekly illustrated journal, conducted by Mr. W. Robinson, has begun well: the first number is full of useful information.——The *Dark Blue*, *Temple Bar*, the *People's Magazine*, and *London Society*, now before us, all maintain their position this month. The Christmas number of the last, *London Society*, is contributed to by Shirley Brooks, Clement Scott, G. A. Sala, Tom Hood, Lady Hardy, and several other equally well-known writers, and is a very good shilling's worth. ——The *Labour News* is a new weekly penny organ of information on the condition and requirements of the labour market for workmen, employers, societies, and all interested in national industries. It seems to be well adapted to become of great use to the working-classes generally, much in the same way that the *Era* newspaper is to persons employed in the theatrical world. The number for December 2nd contains a table of agricultural labourers' earnings in England and Wales compiled from a Parliamentary return.

Miscellanea.

Improvement at the Embankment, Blackfriars.—At the last sitting of the Court of Sewers, the chairman of the City Lands Committee presented a plan of improvements and alterations at the corner of New Bridge-street, Blackfriars, and the Thames Embankment. The object was to obtain a small angle of ground, of about 39 ft. super, which now forms part of Chatham-place. In exchange for this, Mr. De Keyser, of the Royal Hotel, would throw into the Embankment some thousands of feet, by the reconstruction of that building. Mr. Haywood, the engineer, said, in answer to a question, that he could certainly commend the plan to the approval of the court, for there could not be two opinions as to the public improvement which it would effect. The court concurred, and the plan was unanimously approved.

The Inauguration of the New Boulevard in Brussels. — The inauguration of the great work of arching over the river Senne in its course through Brussels, and of the new Boulevard which passes over the artificial bed formed for this dirty stream, is reported by the Brussels correspondent of the *Morning Post*. The King, owing to indisposition, did not attend the ceremony. The Burgomaster only and the Town Council of Brussels went in procession from the Hôtel de Ville up the whole length of the new Boulevard to the wooden building where the sluices to admit the river into its new bed had been established. The object of these works, begun in 1868, was to cover in and purify the river Senne. Previously to their execution the sewage was discharged into the river, which had thus become a large public sewer, exhaling in its course the most unwholesome odours, and which frequently inundated the lower part of the city. Those evils have now been remedied, the sewage being collected in two outfall brick sewers, and the river being thus left to carry its waters untainted beneath the arching constructed for it, over which runs the new Boulevards for a length of one mile and a quarter. The initiation of this important work is said to be due to the present burgomaster, M. Anspach. The works have been carried out by Messrs. Waring, Brothers, of London, who have been ably seconded by M. Louis Genis, the chief engineer; Mr. Fowles, the active English agent of Messrs. Waring; and M. l'Avocat Willemaers, their legal adviser. These gentlemen, affirms the correspondent, have performed their several functions to the entire satisfaction of the municipality and inhabitants of Brussels.

Relating to Ventilation.—*Food, Water, and Air* says:—Air, to be regarded as pure, should not contain more than ·4 of carbonic acid to 1,000 cubic feet; and it has been observed that when this quantity reaches to ·6 per 1,000 feet, the odour of the air of the room, as tested simply by the sense of smell, becomes perceptibly tainted. Hence Dr. Parkes has rightly fixed that the limit of excess of carbonic acid over the standard of purity should not be greater than ·20 of carbonic acid per 1,000 cubic feet of air. Now, it will be obvious that the above conditions have by no means been fulfilled in the case of the great majority of mankind. In the dwellings of the labouring classes they are scarcely ever so, and but very seldom even in the houses of the rich. In bedrooms, in some cases, no doubt they are so, but very rarely in the sitting-rooms. We have next to inquire how this standard of purity of the air is to be attained. In two ways: partly by the size of the rooms,—but large rooms are not always procurable; mainly by efficient ventilation. Thus *every room* should be furnished with a fireplace, which should not be fitted with a mischievous register stove. The windows should open at the top, and the room should be furnished with an inlet for fresh and an outlet for foul air, appropriately placed, and of the requisite dimensions. An inlet of about 60 in. will be sufficient for three men, and an outlet of rather larger size, one of a square foot, 144 in., for six people.

The Royal Society.—On the 30th ult. the annual meeting of the Fellows of this Society was held in the temporary building at Burlington House, General Sir Edward Sabine, K.C.B., in the chair. There was a very large attendance of members. The president, in his opening address, adverted to the various scientific discoveries which had been made in past years, and regretted the losses which the Society had sustained by the death of several Fellows. Afterwards the gold medals of the Society were presented to Mr. George Busk, F.R.S., President of the Royal College of Surgeons, and to Dr. John Stenhouse, F.R.S. The Copley medal was awarded to Mr. Julius Robert Meyer, of Holbroom. Professor George Biddell Airy, D.C.L., LL.D., was elected president for the next year. The delay that has occurred in the erection of the new building for the Societies has caused much inconvenience. Is it even now going on as rapidly as it should be?

The Roman Villa at Northleigh.—The Oxford Architectural Society has been rightly urging the Duke of Marlborough to do something for the preservation of these interesting remains. A correspondent writes us, however, that nothing has been done. It would not be a creditable thing to allow them to be destroyed. We will give some particulars in our next.

Destructive Fire at Warwick Castle.—Our readers will have ere now seen accounts of the destruction of a considerable portion of Warwick Castle, including the private apartments, the baronial hall, and the banqueting hall. The salvation of the state apartments, the destruction of which at one time seemed inevitable, was due to the massive stone wall which separated the baronial-hall from the red drawing-room. This prevented the extension of the fire below, and the firemen cut the connexion on the roof. Two of Lord Warwick's youngest children had a narrow escape from the nurseries over the banqueting-hall, where they were sleeping with the governess. The chief members of the family were from home, as not unfrequently happens in such cases; but although there were workmen on the premises during the day, they were not engaged in the part of the castle destroyed; but the beginning of the fire was so close to apartments where servants of the family were, that the alarm was given by their hearing the crackling of the burning combustibles. The property saved from the state apartments, which were stripped when the advent of the fire seemed imminent, includes the whole of the valuable pictures and the entire furniture. Pictures which were torn from the frames are not themselves damaged; and the fine Brussels tapestry, taken from Queen Anne's bedroom, is only slightly torn. The whole of the property saved is stored in the County-hall. It is a sad circumstance that the invaluable works of art with which the mansions and castles of the nobility and gentry of this country are full, are at the mercy of any careless or wicked person and that even the existent proprietors, or guardians, as we might call them on the part of the public, who are also interested in them, do not provide safer accommodation for them than they but too often do. Even our National Gallery is not fire-proof, and may at any time be burnt down with much of its treasure.

New Churches for St. Mary, Newington. A meeting has been held at Newington Butts for the purpose of devising means for erecting two new churches in that parish,—one a new parish church, to be erected on a more central and convenient site than that occupied by the present building; the other a small missionary church, to occupy a position in the churchyard more removed from the highway than the present structure. The chair was taken by the Rev. Mr. Maclagan, M.A., rector of Newington and rural dean, and there were also present the Bishop of London, and a large number of the principal inhabitants of the parish. It was stated that the new churches would cost about 14,000*l.*, of which 5,000*l.* would be given by the Commissioners of Works, who required the removal of the present building; and consequently a sum of 9,000*l.* would have to be raised by public subscription. Dr. Dalby moved a resolution pledging the meeting to strenuous exertions in the raising of the funds required for the erection of the new churches. Mr. Hammond seconded the resolution, which was carried unanimously. A list of contributions was then read from the chair, including 1,000*l.* from the rector; Mr. A. B. Bryer, 500*l.*; Mr. C. Hammond, 500*l.*; Mr. P. Cazenove, 100*l.*; Mr. Tarn, 100*l.*, with several smaller contributions, amounting altogether to one quarter of the whole amount required.

Asphalte Paving and Bituminous Rock Companies.—From a tabular statement of facts compiled by Mr. Albert Sharwood, it appears that since February last twenty-three different asphalte and paving companies have been formed in this country, with capital in the aggregate of 3,220,000*l.* The *Financier* says,—"Several of the companies that have been formed have been established to supply the demand in foreign countries. It appears that the various companies deal with ten different sorts of asphalte. Three are for paving streets, &c., in London and the provinces; and two for paving in the provinces only." It is to be hoped the cognate word, "Bit-you-men," will not have to be applied in many cases.

Finsbury and Southwark Parks.—A long discussion took place at a recent meeting of the Metropolitan Board of Works upon the motion of Mr. Newton to rescind a previous resolution of the Board to build on a portion of the land acquired for Finsbury and Southwark Parks. Eventually the motion to rescind was lost, by a majority of 22 to 12. A vote of two-thirds of those present would have been required to carry the proposition.

The Movement and Alteration of Stone Piers and Towers by Solar and other Heat. — In reference to a paper by Mr. Rockwood, an American professor, on the influence of the solar rays on an astronomical tower, a correspondent of the *Engineer* states that previous and more minute experiments had been made at the Edinburgh Observatory by Professor Piazzi Smyth, in which he found that a series of small lamps appreciably moved the Craigleith sandstone piers at the Observatory for carrying transit instruments. Subsequent observations made by Professor Smyth led him to "recognise beyond all doubt the truth of Henderson's [his predecessor's] conclusions, viz., that there was an annual fluctuation in the level of the transit axis depending on the temperature, and not only so, but that there was a fluctuation likewise in the position of the instrument as regarded the azimuth of its axis, and to even four times the amount of level disturbance." The lamps used gave "a decided proof of how dreadfully sensitive these stone piers are to the faintest heat emanations, and explained once extravagances of the azimuthal over the level fluctuations noted from year to year." Professor Smyth suggests gilding the casings of the piers, and circulating air spirally between the casings and the piers. The Mokattam limestone of the casings of the Great Pyramid of Egypt, he considers, was probably the best possible stone for protecting the pyramid itself from the constant waste producible by changes of temperature, by day and night, and from season to season. The professor might try to solve the problem whether the legendary story of the influence of the sun's rays on the stone Memnon in causing sounds may have had any physical facts of this order to rest upon.

Lectures on the Fine Arts. — The introductory lecture to a course of twelve lectures, which Mr. Redford has undertaken, was given on the 4th at the Gallery of the new British Institution, Old Bond-street. At the close he said:— Perfect beauty in art was like living natural beauty,—the sum of many conditions and qualities, not one of which could be dispensed with without injury. The real could not be separated from the ideal without loss, although it was true that poetic truth was often displayed by work which was false in many ways; yet it was so far an incomplete work. Though he had pointed out the antagonism between art and civilisation, it was not the great wars, such as those which we had witnessed in the last fifteen years, which debased art, for they increased the power of the emotions, made men serious, and formed us heroes; but it was what civilisation brought in its train,—the insidious fever of wealth and social rivalry of display and self-assertion,—that enervated art. He looked with faith to the native fertility of the intellectual soil of the race, its improvability, and the vast influence of literature and science, as well as to the culture of art as a branch of polite education, for any revival of the long-lost faculties of art.

The Leicestershire Architectural and Archæological Society.—The usual bi-monthly meeting of this society was held in the Town Library, Guildhall, Leicester, on Monday in last week, Mr. James Thompson in the chair. Earl Howe was elected a member and a president of the society. Various antiquities, &c., were exhibited, and papers contributed, including one by the Rev. Mackenzie E. C. Walcott, Precentor and Prebendary of Chichester, entitled "An Inventory of St. Mary's Benedictine Nunnery at Langley, co. Leicester, 1485." Mr. John Hunt, of Thurnby, having exhibited a trayful of relics of various periods, found beneath the level of Thurnby Church, in the foundations, and about the fabric, read a paper upon the subject. Mr. T. North, the Honorary Secretary, then read a paper, written by Mr. Vincent Wing, of Melton Mowbray, on Grimston Church.

New Cattle Market at Leicester.—Yesterday, a new cattle-market, built at the expense of the borough, was formally opened at Leicester. The site, which is between the Lutterworth and Walford roads, nearly two miles from the town, covers between 17 and 20 acres, and when the abattoirs and offices connected with it are completed, will have cost from 25,000*l.* to 30,000*l.* The market and abattoirs are connected with the Midland Railway by means of sidings; while extensive cattle-docks have been constructed close by, at the sole cost of the Midland Railway Company, and at an expenditure of nearly 10,000*l.*

The New Roof for the Bristol Corn Exchange.—The iron roof, about to be erected over the quadrangle of the Corn Exchange, at Bristol, for the protection of the dealers and farmers on market days, has just been completed at Mr. Cormell's Lansdown Ironworks, Cheltenham. The design is by Mr. E. M. Barry, R.A., and the main portion of the construction is wrought iron, which is filled in with cast ornamental work, the upper part of the roof being formed into a cupola, with decorated and open panels for ventilation. The whole will be received on a stone cornice, supported by carved figures and columns, with Corinthian carved capitals.

The Vestry Hall of St. Clement Danes. The Vestry-hall of this parish must be removed to make room for the new Courts of Justice. The churchwardens appointed two gentlemen—Messrs. Cadogan and Fry—to survey the property in company with the Government surveyor. The result is, the sum of 10,000*l.* was offered by the Chancellor of the Exchequer for the Vestry-hall, the almshouses, and the now disused burial-ground. Certain claims of the Duchy of Lancaster are also waived, the right of user being granted to the representatives of the duchy in any future building which may be erected on the same site. The offer of the Government has been accepted.

The Proposed Loan of £2,000,000 for the Metropolitan Board.—The proposal of the Metropolitan Board of Works to apply for Parliamentary powers to borrow 2,000,000*l.* for certain metropolitan improvements, was under the consideration of the Hampstead Vestry, on Thursday night, and a resolution was passed, on the motion of Mr. Aspinall, seconded by Mr. Stone, expressing approval of the proposed works. The chairman (Mr. Le Breton) said the precept of the Metropolitan Board would only be 2d. or 2½d. in the pound next year, instead of 5d. as it had been. It would be ten years before anybody was called upon to pay anything towards the proposed improvements.

Escape of Gas.—A correspondent writes,—Referring to your valuable remarks the other day on gas escape, I may send you an instance which occurred in my own library not long ago. I had been for a considerable time annoyed by a smell of gas proceeding, as I thought, from the fireplace. But on employing a gasfitter, who had the carpet lifted, and the surface examined, we found that a joiner had driven a nail right through the centre of the pipe which supplied the gas chandelier in the room below. An explosion might have occurred had I not taken the precaution, in accordance with your advice, to leave the window open all night.

Explosion at the Railway Clearing-House.—For some time a number of carpenters and other workmen have been employed in making alterations, especially at the northern end of the clearing house, forming the corner of Bedford-street. About twenty minutes past five p.m. on Wednesday in last week, nearly the whole of the clerks having fortunately left at five, a terrific explosion of gas took place, blowing the whole of the windows on the Bedford-street side into the street—portions reaching the Russell Arms and houses on the opposite side. It is believed the gas-piping had been removed or broken, causing the gas to escape.

Appropriation of a Railway Waiting-room.—The waiting-room of the Rye-lane Station at Peckham, which is the joint property of the London and Brighton and Chatham and Dover Companies, and is so very large that a considerable portion of the space occupied by it, which extends the entire distance used by the two companies respectively, is comparatively useless, is about to be appropriated to the sale of fancy articles; and in order to carry out this object, shops and stalls are to be erected by the companies, for which they expect to obtain a considerable rental.

The Purchase of Hampstead Heath.—Mr. Le Breton has reported to the Hampstead Vestry that the Metropolitan Board of Works have completed the purchase of Hampstead Heath from Sir John Wilson and Mr. Spencer Wilson by the payment of 45,000*l.*, and 2,000*l.* for expenses. Sir John Wilson and his son claimed interest on the money, but Mr. Smith, the board's solicitor, resisted this, and it was given up.

Gift of an Hospital for Dundee by Sir David Baxter.—At a recent meeting of the Dundee Royal Infirmary it was announced that Sir David Baxter had offered to erect and endow a convalescent hospital in connexion with the Dundee Infirmary. The hospital is to contain fifty to sixty beds, and to be open to patients from the Infirmary, and also to the inhabitants of the town generally who may require the benefit of such an institution. The building of the hospital is to be commenced at once. It has been estimated that to carry out his intentions will cost the donor from 20,000*l.* to 30,000*l.*

The Soudan Railway.—The *Times* says that the staff of engineers sent out by Mr. Fowler, on behalf of the Government of Egypt, to survey and lay out the proposed Soudan Railway, have already commenced operations on the whole length of the line between the second cataract and Kartoom. The staff, which consists of twenty experienced English surveyors, an English surgeon, and numerous native assistants, are all in excellent health, and speak highly of the arrangements of the Egyptian Government in carrying out Mr. Fowler's programme for their progress and work. The highest importance has long been attached to this railway communication in the interests of Egypt.

Kidderminster [Public] Water Supply.—At a recent trial of the new well and bore-hole, by means of a steam-engine working a powerful pump, the yield was found to be at the rate of 500,000 to 700,000 gallons in twenty-four hours. The water only lowered 22 ft. after pumping at this rate, and when pumping ceased it rose at the rate of nearly 3 ft. in five minutes. The well and bore-hole are sunk 500 ft. into the sandstone. The situation of the well is on the high land near Sutton Farm. Mr. T. Tilley, of London, is the contractor for the well; and Mr. Fairbank is the engineer.

Death of the Borough Surveyor of Penzance, in Cornwall.—The death of Mr. John Matthews, who has been for many years the borough surveyor of Penzance, is announced by the *Cornish Telegraph*. It is stated that "he was elected borough surveyor in 1844, the first plans he drew for the town being by competition and for the Prince's-street market. For these he received a premium of 30*l.* Step by step he gained public confidence and esteem, until works of great magnitude were intrusted to him, and he has laid out at least 60,000*l.* for the town of Penzance."

The Brown Institution.—The new Institution at Vauxhall for the Study and Cure of Animal Diseases and Injuries, some particulars of which we lately gave, has now been formally opened. The post of Professor Superintendent of the Institution has been conferred upon Dr. Burdon-Sanderson, Professor of Physiology in University College, who is widely known, especially for his researches into the ultimate pathology of contagion and the nature of cattle-plague. Dr. Burdon-Sanderson has as his assistant Dr. Klein, who was formerly in Dr. Stricker's laboratory at Vienna. The *Times* of the 4th inst. gives a history of this institution.

Conveyance of Slag to Sea.—A committee appointed to investigate the merits of Mr. Joy's plan for carrying slag out to sea at Middlesbrough, have agreed upon its being practicable and economical. It has been resolved to call a meeting of the ironmasters, and report accordingly. Could not the slag be utilised? Have not bricks or building stones, edgings for garden-walks, and other useful forms, been made with slag? Would not casting it into some such forms be a little more "economical" than casting it into the sea?

Industrial School for Criminals.—A proposition to purchase a site at Feltham for the erection of an Industrial School for Juvenile Female Criminals was discussed by the Middlesex magistrates at their last monthly meeting. It was contended by several that the proposed establishment was unnecessary, but the Bench decided by a large majority in its favour, and a committee was appointed to carry the decision into effect. It was resolved, however, that, if possible, a site should be secured with buildings already erected.

Institute of Painters in Water-Colours.—The private view of the Winter Exhibition of Sketches and Studies will be given this Saturday, the 9th.

Royal Albert Hall.—A very numerous audience was gathered in the Albert Hall, nearly filling it, on Tuesday evening last, to hear a sacred cantata, composed by Mr. William Carter, and entitled "Placida, the Christian Martyr." Madame Lemmens-Sherrington and Mr. Edward Lloyd sang especially well in it. Mr. Carter shows in his work much learning and skill, and won the hearty praises of a large proportion of his audience. We shall doubtless hear more of Mr. W. Carter.

Leicester-square Market, Station, and other Improvements.—Parliament is to be applied to next session for power to construct market-houses and other buildings, approaches, and streets, and a railway-station and other works, at Leicester-square. The market will be for the sale of fruits, flowers, vegetables, meat, fish, poultry, butter, cheese, and other provisions. The station will be in connexion with the Central, the North-Western, Midland, and South-Eastern Railways.

Admiralty and War-Office Re-building. Notice is given that application is intended to be made to Parliament in the ensuing session on behalf of the Commissioners of her Majesty's Works and Public Buildings for an Act to authorise the Commissioners to acquire and take by compulsion or agreement, certain lands, houses, tenements, and hereditaments described, for the purpose of erecting thereon the new building or buildings at Whitehall, for the Admiralty and War-office.

The Farningham Organ and Choir Fund. An entertainment on the 23rd ult. at Farningham, in aid of this fund, was chiefly distinguished by the readings of Mr. C. Roach Smith, whose excellence as a reader, and power in delineating every shade of character, are known farther than Kent. Mr. Smith read scenes from "The Rivals," "John Bull," "Hamlet," and "The School for Scandal," with great effect.

Chorley Town Hall Competition.—At the last meeting of the Commissioners it was stated that 227 plans of the ground had been sent out. The time for sending in designs was extended to the 30th of January next. "One Who Intended to Compete," writes,—"The site to be covered has a good street on every side, and the building must have one front in stone; it embraces upwards of 1,500 square yards, and the buildings must not cost more than 10,000*l.*!"

New Police Court for Marylebone.—A new police-court is to be erected in the large district of Marylebone. Her Majesty's Commissioners of Works and Public Buildings have under consideration the respective advantages of two plots of land, of which one is in Chapel-street, near the Edgware-road, and the other in the Marylebone-road, adjoining the Baker-street station of the Metropolitan Railway.

Meteoric Masses.—The Swedish Arctic Expedition has brought from Greenland, in all, twenty specimens of meteoric iron, two of them of enormous size. One, now placed in the hall of the Royal Academy of Stockholm, measures about 42 square feet, and weighs nearly twenty-one English tons; another, which has been presented to the Museum of Copenhagen, weighs about six tons.

Lambeth Officer of Health.—Dr. MacCormack, medical officer of health for Southampton, has been elected medical officer of health for the district of Lambeth, at a salary of 500*l.* a year. In a Board at which more than a hundred members were present, Dr. MacCormack secured a majority of eleven in the final vote, over sixteen other candidates.

Materials for Fire Escapes.—The Metropolitan Fire Brigade Committee have reported to the Metropolitan Board of Works on the best material for fire-escapes. The committee say that wire netting is preferable to wire gauze, and that hitherto it had been found impossible to render the canvas of escapes uninflammable. The report of the committee was unanimously adopted.

Architect to the Lancashire and Yorkshire Railway Company.—There were over 100 candidates for this office. The board of directors have conferred the appointment on Mr. C. W. Green, architect and surveyor, of Liverpool, who was also a candidate for the surveyorship of that borough, and was one of the nine selected.

Bradford Grammar School Competition. Mr. Edward Simpson, of Bradford, informs us that the third premium was awarded to him, and not to Messrs. Healey, as stated.

TENDERS

For proposed additions to the White Hart Hotel, Margate, for Mr. William A. Fagg. Mr. Joseph S. Moye, architect:—

Gasken & Godden	£2,631 0 0
Cooke & Green	2,528 0 0
Wilson	2,455 0 0
Spencer & Hayward	2,385 0 0
Bushell & Son	2,320 0 0
Adcock & Rees	2,079 0 0

For additions and alterations at Clare Lawn, East Sheen, for Mr. F. Wigan. Mr. R. P. Pope, architect:—

	General Alterations.	Porch.	Kitchen.
Bowling	£2,399	£208	£14
Seal	1,751	255	14
Stimpson	1,725	254	18
Adamson	1,697	240	16
Newman & Mann	1,648	215	14
Sharpenden	1,603	230	12
Wigmore	1,545	350	15

For farm buildings and two cottages at Lorbottle, Northumberland, for Mr. Adam Atkinson. Mr. F. R. Wilson, architect:—

Masons' Work.

Gray	£690 10 0
Young	675 0 0
Balmbro	660 0 0
Yeaman (accepted)	629 0 0

Joiners' Work.

Burn (accepted)	291 0 0

Slaters and Plasterers' Work.

Steel (accepted)	201 0 0

Accepted for nave and vestry of new church at Hebburn, in Jarrow-on-Tyne, for Mr. R. Carr-Ellison. Mr. F. R. Wilson, architect:—

Masons' Work.

Green	£862 11 0

Joiners' Work.

Irving	475 10 0

Slaters' Work.

Beck	75 10 0

Plasterers' Work.

Good	34 15 0

Glaziers' Work.

Wilkin & Dickman	44 0 0

Plumbers' Work.

Hedderly	7 0 0

For five cottages at Ponteland, Northumberland, for Merton College. Mr. F. R. Wilson, architect:—

Yeaman	£847 0 0
Lishman	672 0 0
Donkin & Bates (accepted)	546 12 0

For new shop, Ravenswood-road, Balham-hill. Mr. Nash, architect:—

Dedman (accepted)	£700 0 0

For two cottages in Pine Apple-grove, Tollington Park, for Mr. Staumm. Mr. J. C. Turner, architect:—

Toups	£580 0 0
Hawke	559 0 0
Driver	543 0 0
Gregory (accepted)	532 0 0

For two shops in the Camberwell-road, for Mr. Thos. Stanfield. Mr. George D. Martin, architect:—

Allen	£735 0 0!
Richards	655 0 0
Stevens	543 0 0
Pargeter	413 0 0
High	335 0 0!

For sewer work on the Greenhill Estate, Hampstead. Messrs. E. Fox & Bousfield, surveyors:—

Crockett	£1,675 0 0
Thirst	1,633 0 0
Mann	1,595 0 0
George	1,587 0 0
Watts (accepted)	1,537 0 0

For additions and alterations to the Dove Public-house, Poringland, Norfolk, for Messrs. Steward Patteson & Co., brewers, Norwich. Mr. James S. Benest, architect:—

Browne & Bailey	£177 10 0

For new bar to the Horse Barracks Public-house, Norwich, for Messrs. Steward Patteson & Co. Mr. James S. Benest, architect:—

Downing	£172 12 0
Colman	167 6 0
Taylor	157 10 0
Wright	154 18 0
Browne & Bailey (accepted)	148 8 0

For alterations to the King's Head Public-house, Hoveton, Norfolk, for Messrs. Steward Patteson & Co. Mr. James S. Benest, architect:—

Browne & Bailey	£502 0 0
Downing	495 0 0
Colman	494 10 0
Wright	488 0 0
Taylor (accepted)	475 10 0

For stabling, &c., in Catherine-street, Buckingham Gate, for Mr. A. P. Vivian, M.P. Messrs. Middleton & Goodman, architects. Quantities by Mr. Lansdown:—

Patman & Fotheringham	£1,376 0 0
Saul	1,298 0 0
Scrivener & White	1,278 0 0
Nightingale	1,190 0 0
Mitchell	1,150 0 0

For Mason's Hill Schools, Bromley, Kent. Mr. W. C. Banks, architect:—

Cooper	£1,159 0 0
Jays	1,125 0 0
Arnaud	1,049 0 0
Jerrard	1,036 0 0
Pain & Balding	1,035 0 0
Grubb	885 0 0

For new warehouses, Turnagain-lane, Farringdon-street, for Mr. J. H. Collier. Mr. Thomas Renton, architect:—

Lidstone & Son	£2,400 0 0
Gammon & Son	2,246 0 0
Newman & Mann	2,075 0 0
Elkington	1,999 0 0
Foster	1,977 0 0
Pritchard	1,942 0 0

For the erection of Wesleyan Chapel, Hampstead. Mr. Charles Bell, architect. Quantities supplied by Messrs. H. Lovegrove & W. H. Barber:—

Wicks, Bangs, & Co.	£4,875 0 0
Patman & Fotheringham	4,787 0 0
Dove Brothers	4,545 0 0
Hobson	4,455 0 0
Stevenson	4,208 0 0
Hibbins & Trasler	4,196 0 0
Chesham	4,150 0 0
Henshaw	4,094 0 0
Scrivener & White	4,048 0 0
Nutt & Co. (accepted, subject to certain modifications)	3,950 0 0

For teachers' residence and school, St. James's, Ponder's-end. Messrs. Paull & Robinson, architects:—

	Residence.	School.
Dove Brothers	£775 0 0	£855 0 0
Child	580 0 0	900 0 0
Linzell	500 0 0	870 0 0
Ward	495 0 0	824 0 0
Field & Sons	538 0 0	718 7 6

TO CORRESPONDENTS.

P. & S.—C. C.—Quercus.—E. O. S.—G. S.—P. W.—T. H.—V. C. C.—G. H. C.—X. Y. Z.—Lincolnshire Fens.—H. H. W.—W. P.—E. J.—S. P.—W. J. S.—A. C.—R. K.—A. & C. H.—W. G. S.—T.—H. B.—W. C.—T. C. N.—H. O.—Captain J.—W. F. P.—M. & H. T.—S. R. S.—F. N. K.—Inquirer (for so small a matter the charge must be according to the time occupied).—W. P. (will be illustrated).—J. F. (will be illustrated).—A. B. (we cannot undertake to teach correspondents how to make valuations).

We are compelled to decline pointing out books and giving addresses.

All statements of facts, lists of Tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

Note.—The responsibility of signed articles, and papers read at public meetings, rests of course with the authors.

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